Russell Technologies Inc.

*Bringing Technology to the Art of Navigation*

# RTI Radar Installation & Maintenance Manual

## XIR3000C

# RUSSELL TECHNOLOGIES INC (RTI)

# INSTALLATION MANUAL

## RTI XIR3000C RADAR PROCESSOR

## &

## ANTENNA CONTROL MODULE

## for

## FURUNO 4, 6, 12 & 25 KW

## RADAR TRANSCEIVERS

**Prepared by:** Russell Technologies Inc.

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North Vancouver, British Columbia

V7M 3G8

# SAFETY INSTRUCTIONS

## WARNING

### ELECTRICAL SHOCK HAZARD

Do not open the equipment unless totally familiar with electrical circuits and service manual. Only qualified personnel should work inside the equipment.

Wear a safety belt and hard hat when working on the antenna unit on the mast. Serious injury or death can result if someone falls from the radar mast.

Construct a suitable service platform from which to install the antenna unit. Serious injury or death can result if someone falls from the radar mast.

Turn off the power at the mains switchboard before beginning the installation.

Fire, electrical shock or serious injury can result if the power is left on or is applied while the equipment is being installed.

**CAUTION:** Ground the equipment to prevent electrical shock and mutual interference.

Observe the following compass safe distances to prevent deviation of a magnetic compass.

| | Standard | Steering |
|---|---|---|
| Display unit: | 0.70 m | 0.45 m |
| MODEL1834C antenna unit: | 0.90 m | 0.70 m |
| MODEL1934C antenna unit: | 1.00 m | 0.80 m |
| MODEL1944C antenna unit: | 1.00 m | 0.80 m |
| MODEL1954C antenna unit: | 1.00 m | 0.75 m |
| MODEL 1964C antenna unit: | 1.65 m | 1.25 m |

# WARNING

## Radio Frequency

## Radiation Hazard

The radar antenna emits electromagnetic radio frequency (RF) energy which can be harmful, particularly to your eyes. Never look directly into the antenna aperture from a close distance while the radar is in operation or expose yourself to the transmitting antenna at a close distance.

Distances at which RF radiation levels of 100 and 10 W/m2 exist are given in the table below.

**Note: If the antenna unit is installed at a close distance in front of the wheel house, your administration may require halt of transmission within a certain sector of antenna revolution. This is possible - Ask your RADAR representative or dealer to provide this feature.**

| | **Distance to 10 W/m$^2$ Point** | **Distance to 100 W/m$^2$ point** |
|---|---|---|
| **MODEL** | | |
| Model 1834C | Nil | Worst case 1.80 m |
| Model 1934C | Worst case 0.20 m | Worst case 3.00 m |
| Model 1944C | Nil | Worst case 2.50 m |
| Model 1954C: | | |
| Antenna XN-12A | Nil | Worst case 2.50 m |
| AntennaXN-13A | Nil | Worst case 2.30 m |
| Model 1964C: | | |
| Antenna XN-12A | Worst case 0.80 m | Worst case 9.50 m |
| AntennaXN-13A | Worst case 0.60 m | Worst case 8.00 m |

# Contents

SAFETY INSTRUCTIONS ..... 3

INTRODUCTION ..... 8

SYSTEM CONFIGURATIONS ..... 8

1. MOUNTING ..... 14

1.1 Mounting the Display Unit ..... 14

1.2 Mounting the PC Radar Processor ..... 14

Layout and Dimension of the XIR3000C Radar Processor System ..... 16

1.3 Mounting the Antenna Unit of MODEL 1832 / 1834C ..... 16

1.3.1 Mounting considerations ..... 16

1.3.2 Mounting procedure ..... 17

1.4 Mounting the Antenna Unit of MODEL1934C/1944C/1954C/1964C ..... 22

1.4.1 Mounting considerations ..... 22

1.4.2 Mounting procedure ..... 23

2. WIRING ..... 32

2.1 Standard Wiring ..... 32

Layout and Dimension of the XIR3000C Radar Processor System ..... 33

2.1.1 Power requirement ..... 37

3. SETTING UP THE EQUIPMENT ..... 38

3.1 System Setup after Installation ..... 38

3.2 Setup of Radar System Signals ..... 39

3.2.1 RadarSample Usage Setup Instructions ..... 39

RTI Packing List for XIR3000C with Furuno 1832 24” Radome Radar Transceiver ..... 49

RTI Packing List for XIR3000C with Furuno 1834 24” Radome Radar Transceiver ..... 50

RTI Packing List for XIR3000C with Furuno 1944 Radar Transceiver ..... 51

RTI Packing List for XIR3000C with Furuno 1954 Radar Transceiver ..... 53

RTI Packing List for XIR3000C with Furuno 1964 Radar Transceiver ..... 55

EQUIPMENT LISTS

## Standard supply

| Name | Type | Code No. | Qty | Remarks |
|---|---|---|---|---|
| Antenna Unit / | RSB-0071-057 | | 1 | MODEL 1832/1834C |
| Transceiver | XN10A-RSB-0070-064 | | 1 | MODEL 1934C, 24 rpm |
| | XN10A-RSB-0073-064 | | 1 | MODEL 1934C, 48 rpm |
| | XN12A-RSB-0070-059 | | 1 | MODEL 1944C, 24 rpm |
| | XN12A-RSB-0073-059 | | 1 | MODEL 1944C, 48 rpm |
| | XN12A-RSB-0072-060 | | 1 | MODEL 1954C, 4’, 24 rpm |
| | XN12A-RSB-0073-060 | | 1 | MODEL 1954C, 4’, 48 rpm |
| | XN13A-RSB-0072-060 | | 1 | MODEL 1954C, 6’, 24 rpm |
| | XN12A-RSB-0072-061 | | 1 | MODEL 1964C, 4’, 24 rpm |
| | XN12A-RSB-0073-061 | | 1 | MODEL 1964C, 4’, 48 rpm |
| | XN13A-RSB-0072-061 | | 1 | MODEL 1964C, 6’, 24 rpm |
| Processor Unit | XIR3000C | | 1 | Processor Unit for all units |
| ACM Unit | Antenna Control Module (ACM) | | 1 | ACM for all models |
| Cabling | Two CAT5E cables | | 2 | Two cables per system |
| Power Cable | 12 VDC Power Cable | | 1 | One cable per system |

# INTRODUCTION

This installation manual covers the installation of the Russell Technologies Inc (RTI) XIR3000C PC-based radar processor system with the following Furuno radar transceivers:

a. MODEL 1832 / 1834C MARINE RADAR TRANSCIEVER INTALLATION.

b. MODEL 1934C MARINE RADAR TRANSCIEVER INTALLATION.

c. MODEL 1944C MARINE RADAR TRANSCIEVER INTALLATION.

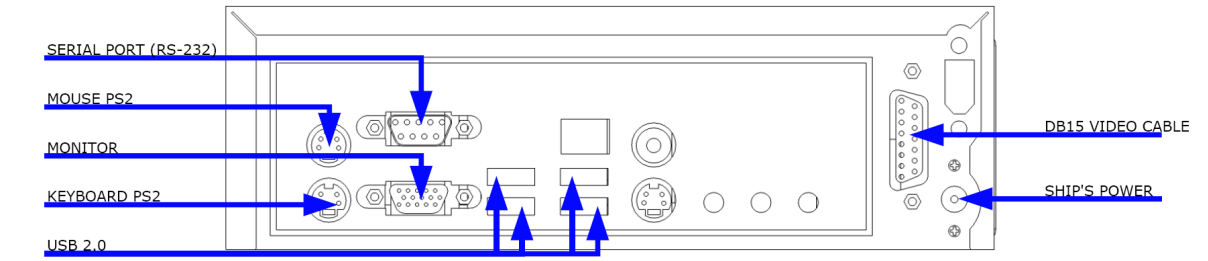
d. MODEL 1954C MARINE RADAR TRANSCIEVER INTALLATION.

e. MODEL 1964C MARINE RADAR TRANSCIEVER INTALLATION.

f. XIR3000C RADAR PROCESSOR INSTALLATION.

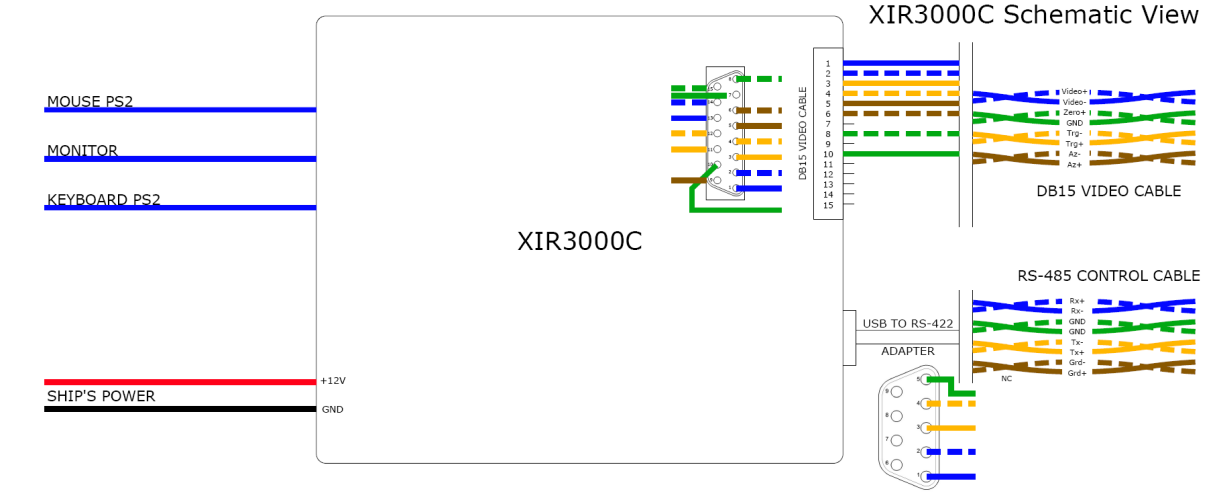
# SYSTEM CONFIGURATIONS

All RTI products incorporate a standard “network” capability to integrate the radar transceiver and other product on board through a standard LAN cable (Ethernet 10/100BASE-T). Each RTI product is assigned an IP address to enable transfer of information between systems. The number of display units which may be installed depends on the number of network connections. The system has the ability to operate in a client / server architecture with one “Active Client” and unlimited “Passive Clients.” The diagrams shown below is a sample of the overall interconnection of the PC-based RTI system using the Furuno models 1832 / 1834C and models 1944 / 1954 transceiver with the RTI Antenna Control Module (ACM) mounted within the transceiver and interconnected to the XIR3000C radar processor unit. The configuration for all other transceivers is similar as shown in these interconnection diagrams.




XIR3000C Back View

XIR3000C Schematic View

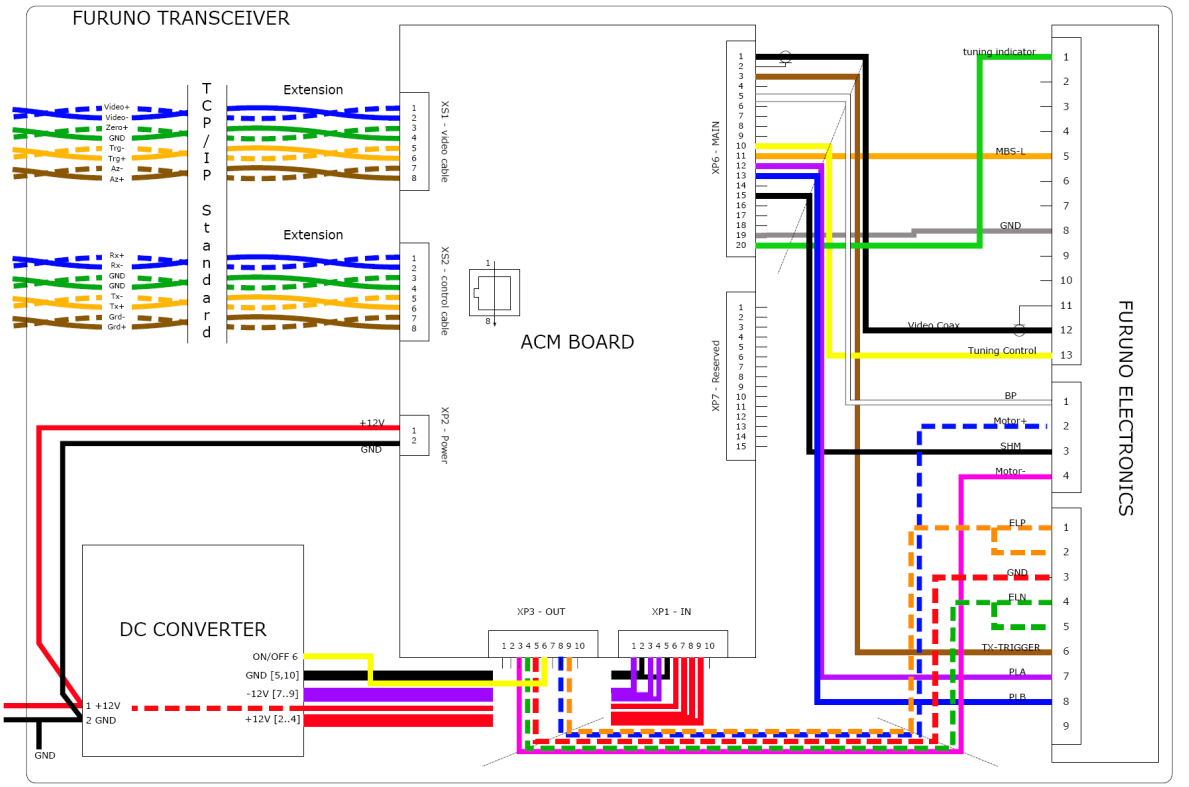



Russell Technologies Inc.

PC SIDE

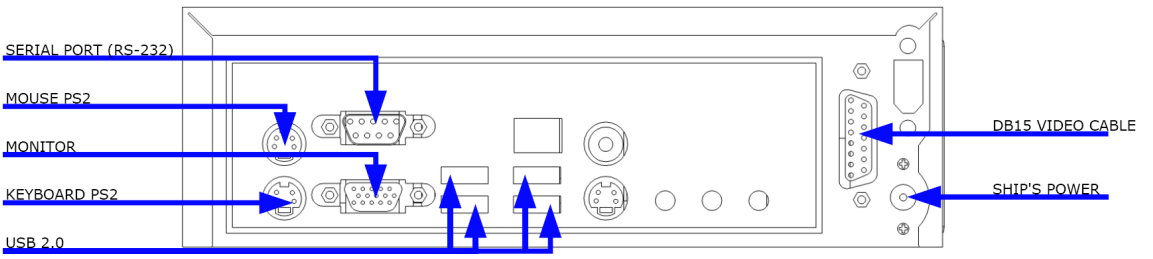
XIR3000C system
Wiring diagram for FURUNO transceiver model n. 1832
Rev8

**RTI XIR3000C SYSTEM – PART 1: MODELS 1832/1834C**



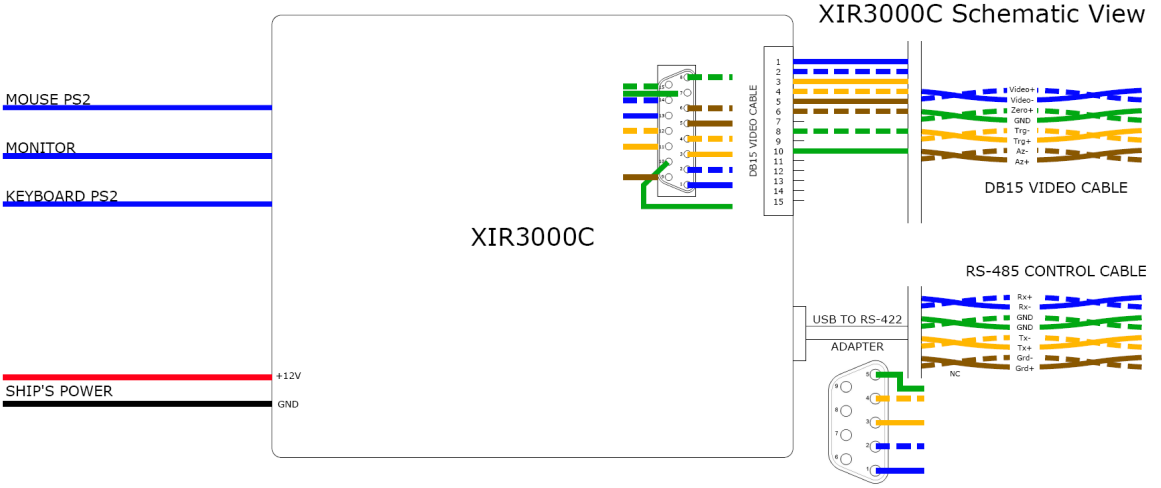

| | | |
|---|---|---|
| Russell Technologies Inc. | ACM SIDE | XIR3000C system<br>Wiring diagram for FURUNO transceiver model n. 1832<br>Rev8 |

## RTI XIR3000C SYSTEM – PART 2: MODELS 1832/1834C



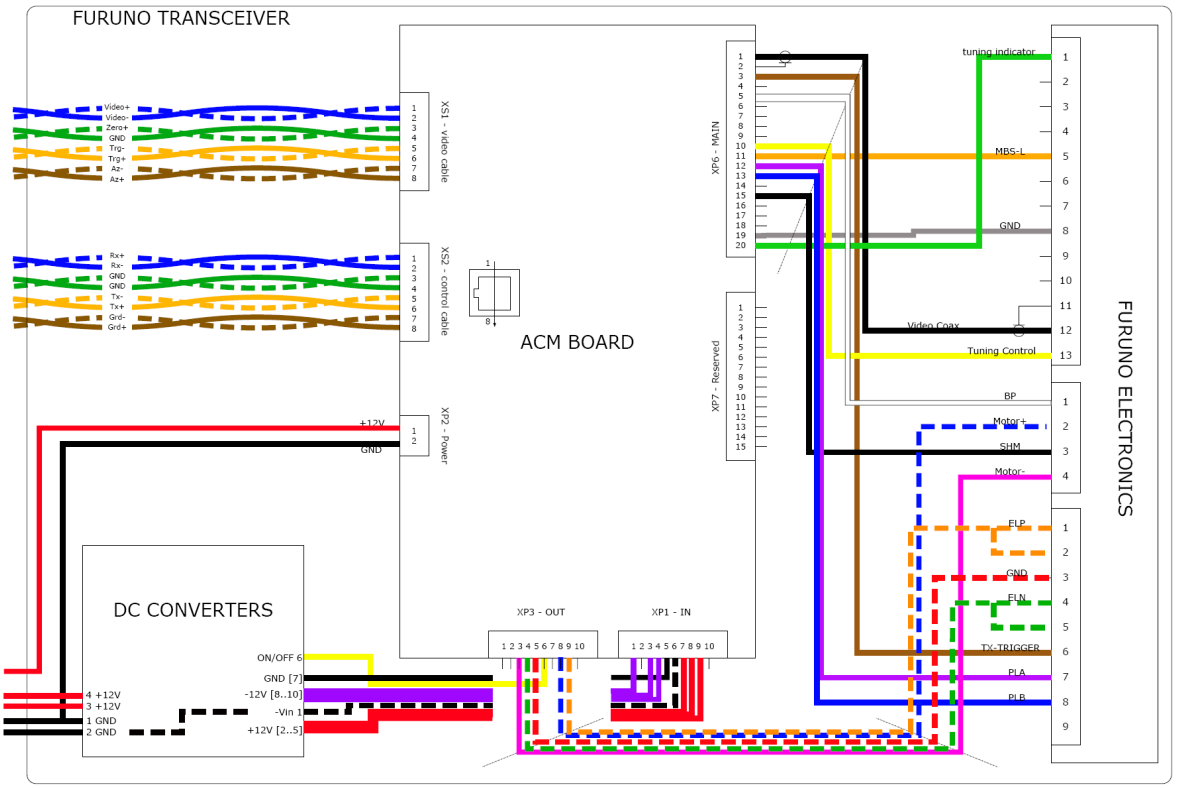

XIR3000C Back View

XIR3000C Schematic View



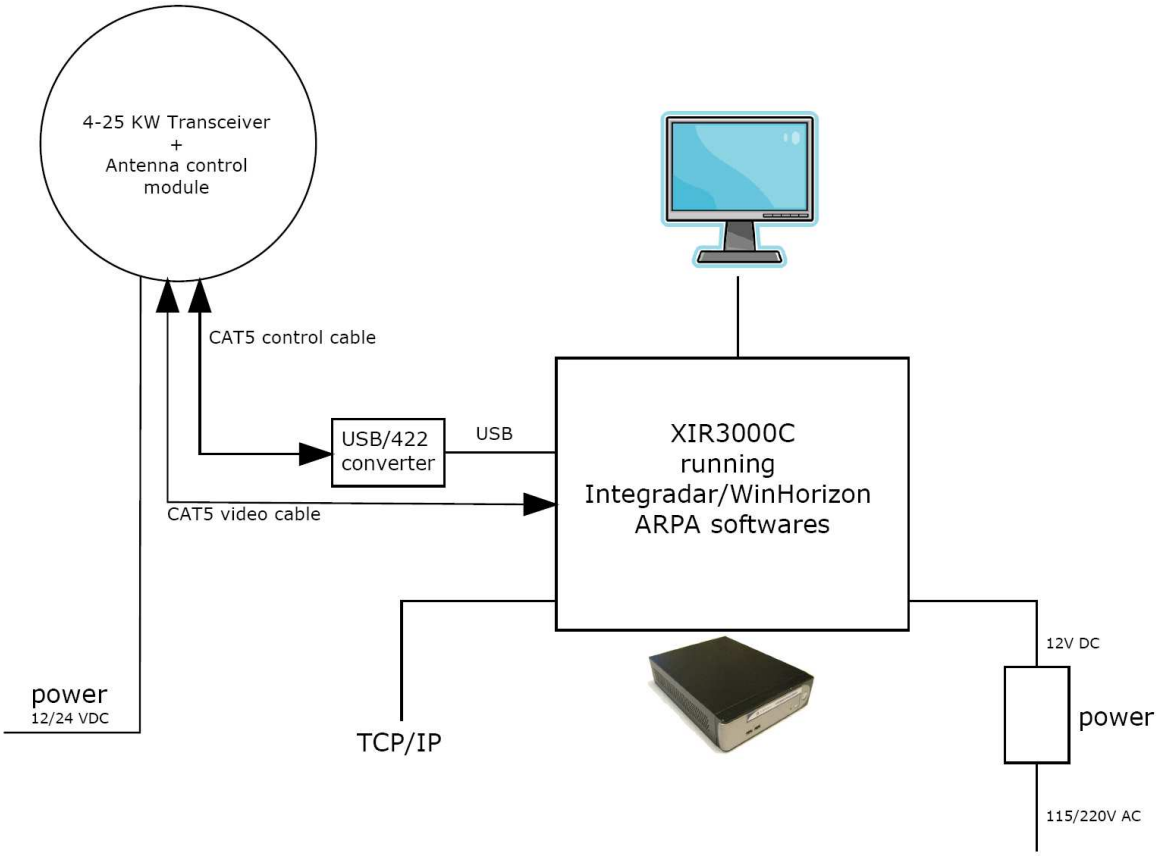

| | | |
|---|---|---|
| Russell Technologies Inc. | PC SIDE | XIR3000C system<br>Wiring diagram for FURUNO transceiver model n. 7112<br>Rev2 |

**RTI XIR3000C SYSTEM – PART 1: MODELS 1944/1954**




| | | |
|---|---|---|
| Russell Technologies Inc. | ACM side | XIR3000C system<br>Wiring diagram for FURUNO transceiver model n. 7112<br>Rev2 |

## RTI XIR3000C SYSTEM – PART 2: MODELS 1944/1954




**RTI PC Radar Processor Interconnection Diagram**

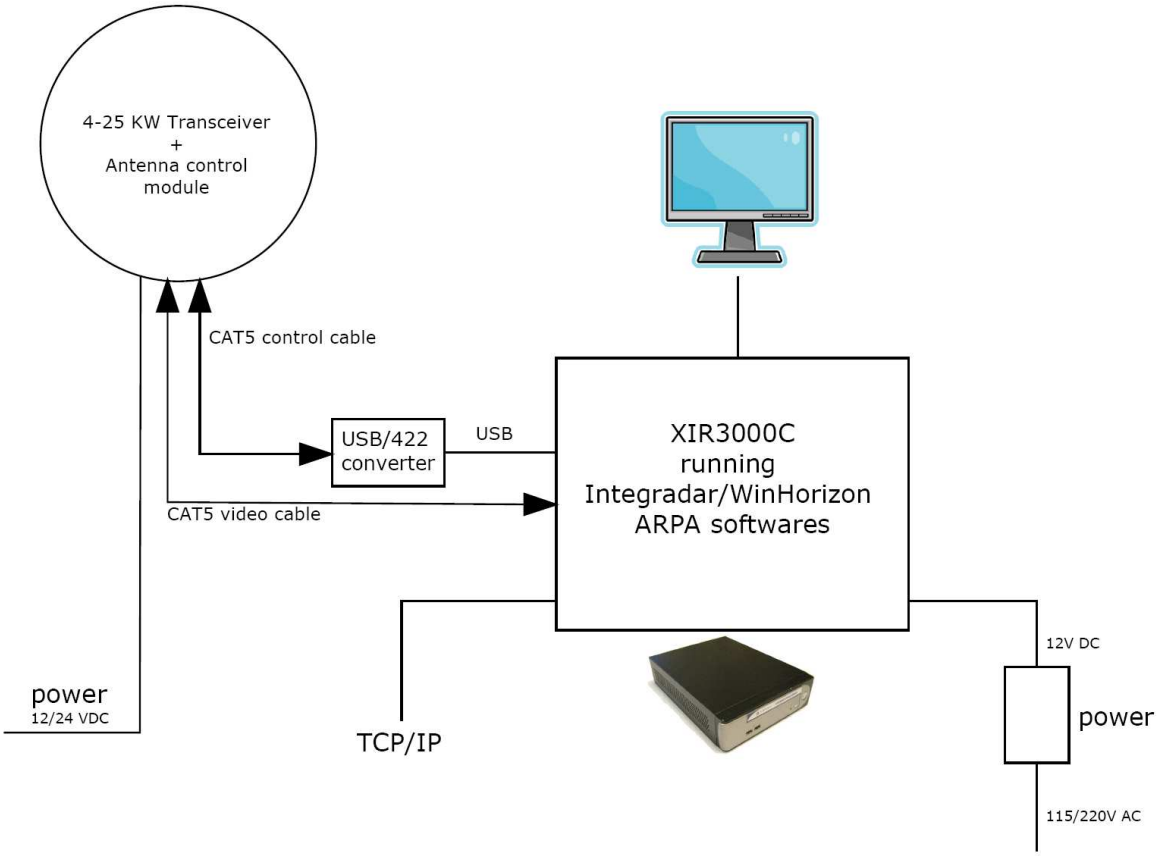
# 1. MOUNTING

***1.1 Mounting the Display Unit.*** The display unit mounting is user defined as the system is normally provided with a user specified display unit.

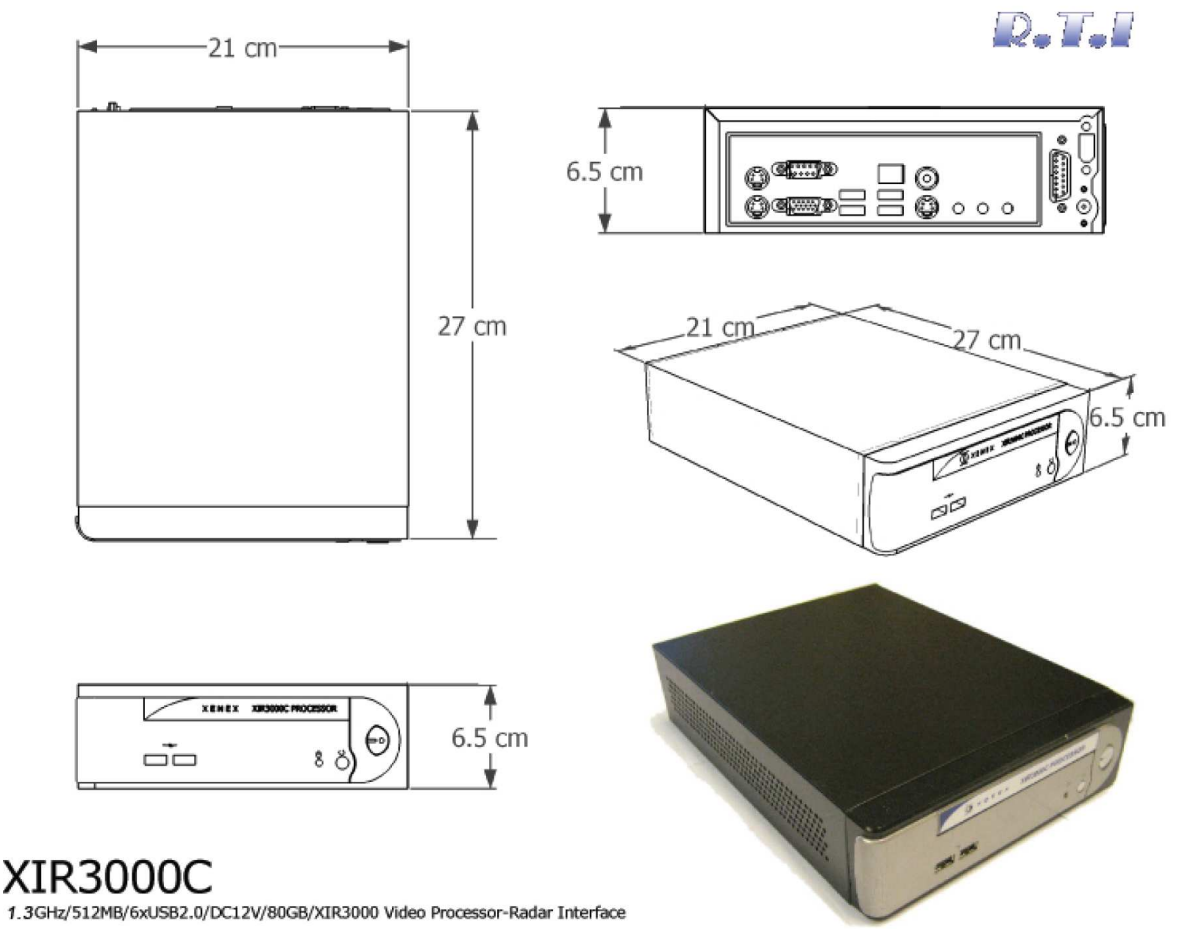
***1.2 Mounting the PC Radar Processor.*** The PC Radar Processor is to be mounting in an environmentally protected area away from water, high condensation and zero degrees centigrade or below temperatures. It should be mounted in a well ventilated compartment to allow for air flow for cooling purposes. When mounting the radar processor follow the general guidelines as follows:

- There is no mounting hardware provide as the radar processor can be easily mounted in a number of possible locations and configurations.
- Mount the RS-422 to USB converter close to the radar processor to allow for ease of attachment to the USB port at the rear of the radar processor.
- Mount in an area where the front and back of the PC are easily accessible.
- Insure intake and exhaust vents are not obstructed to allow for airflow through the radar processor for correct cooling.
- Insure that the ON/OFF power switch is accessible for powering the system ON and OFF.
- Do not place any other electronic system directly on top off or directly below the radar processor.
- Insure radar processor is mounted in an area where the two CAT5E cables from the radar transceiver can be easily attached and removed for servicing.
- Insure that the radar processor is mounted where the 12 VDC or 115 VAC is easily accessible. If the 115 VAC to 12 VDC converter is used, ensure that the 115 VAC powers sources is within 8 feet of the radar processor.

The interconnection between the radar processor, ships power and the radar transceiver is shown in the diagram below. Also shown is the overall layout and dimensions on the XIR3000C radar processor system.




**RTI PC Radar Processor Interconnection Diagram**



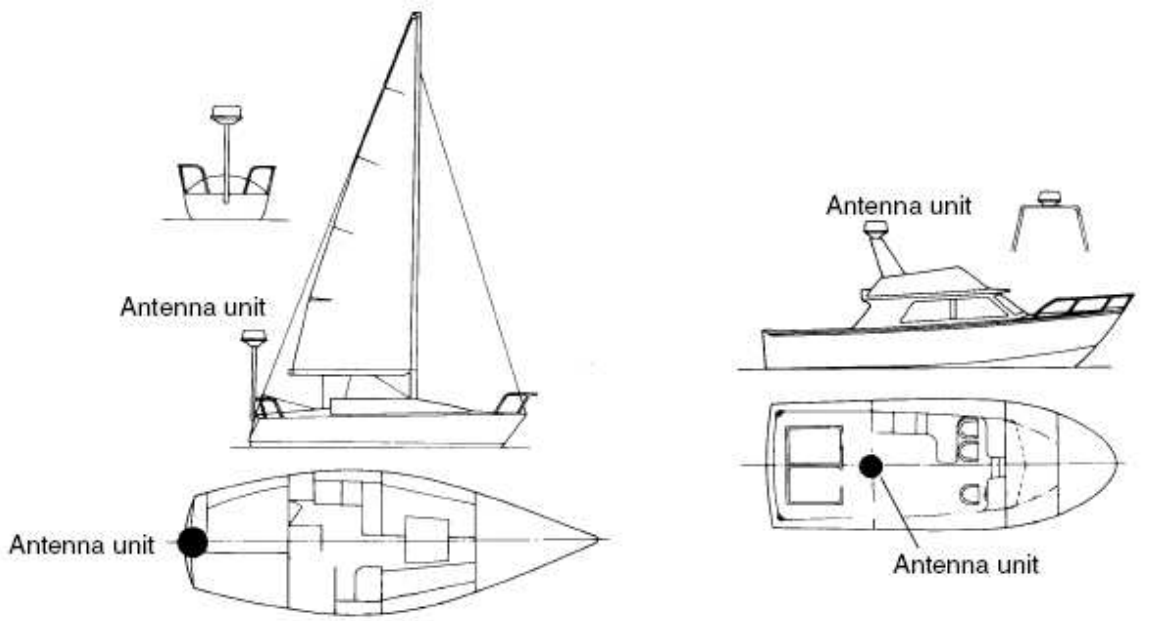

**Layout and Dimension of the XIR3000C Radar Processor System**

## *1.3 Mounting the Antenna Unit of MODELS 1832 / 1834C*

### 1.3.1 Mounting considerations

When selecting a mounting location for the antenna unit, keep in mind the following points.

- Install the antenna unit on the hardtop, radar arch or on a mast on an appropriate platform. It should be placed where there is a good all-round view with, as far as possible, no part of the ship's upper structure or rigging intercepting the scanning beam. Any obstruction will cause shadow and blind sectors. A mast, for instance, with a diameter considerably less than the width of the antenna unit, will cause only a small blind sector. However, a horizontal spreader or crosstrees in the same horizontal plane would be a much more serious obstruction; place the antenna unit well above or below it.




**Typical antenna unit placement on sailboat and powerboat**

- In order to minimize the chance of picking up electrical interference, avoid where possible routing the antenna cable near other electrical equipment onboard. Also avoid running the cable in parallel with power cables.
- Observe the compass safe distances mentioned in the SAFETY INSTRUCTIONS to prevent interference to a magnetic compass.

### 1.3.2 Mounting procedure

1. Open the antenna unit packing box carefully.

2. Unbolt the four bolts at the base of the radome cover to remove the cover if access to the transceiver is required.

Note: The RTI cabling is pre-installed at the factory and removing radome cover is not necessary.

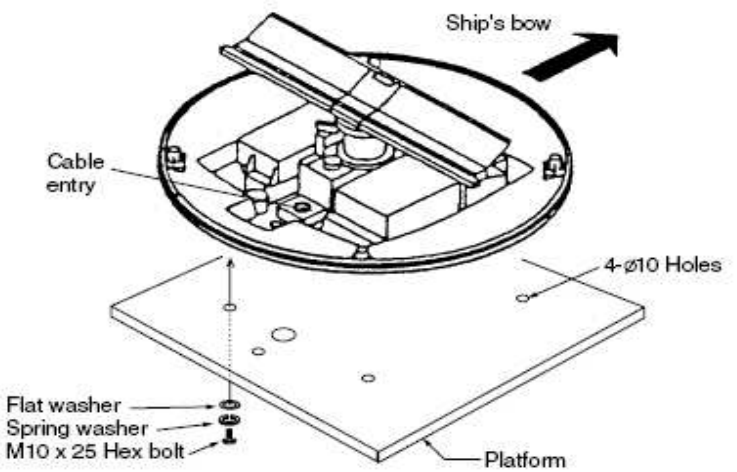
*Antenna unit*

The mounting surface must be parallel with the waterline and provided with five holes (four fixing holes and one cable entry) whose dimensions are shown in the outline drawing at the back of this manual.

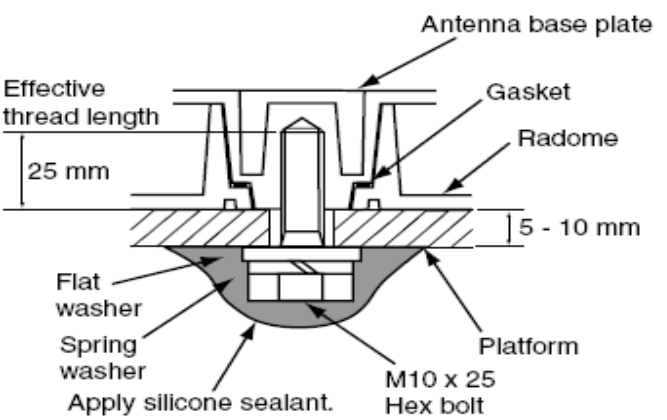
The unit is adjusted so a target echo returned from the bow direction will be shown on the zero degree (heading line) position on the screen. When drilling holes, be sure they are parallel with the fore and aft line.

3. Prepare a platform (wood, steel*, or aluminum) of 5 to 10 millimeters in thickness for the antenna unit. Find the cable entry on the radome base. Next, position the radome base so the cable entry faces the stern direction. This alignment must be as accurate as possible.

Note:  For steel platform, take appropriate measures to prevent corrosion.



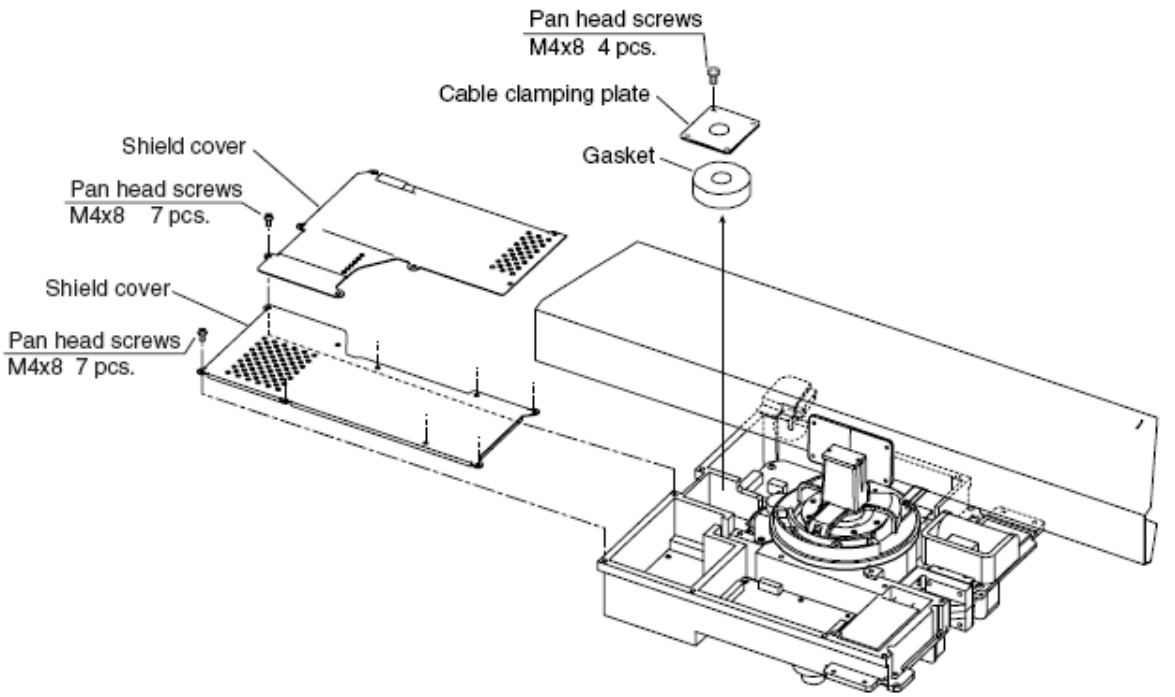

**Antenna unit, cover removed**



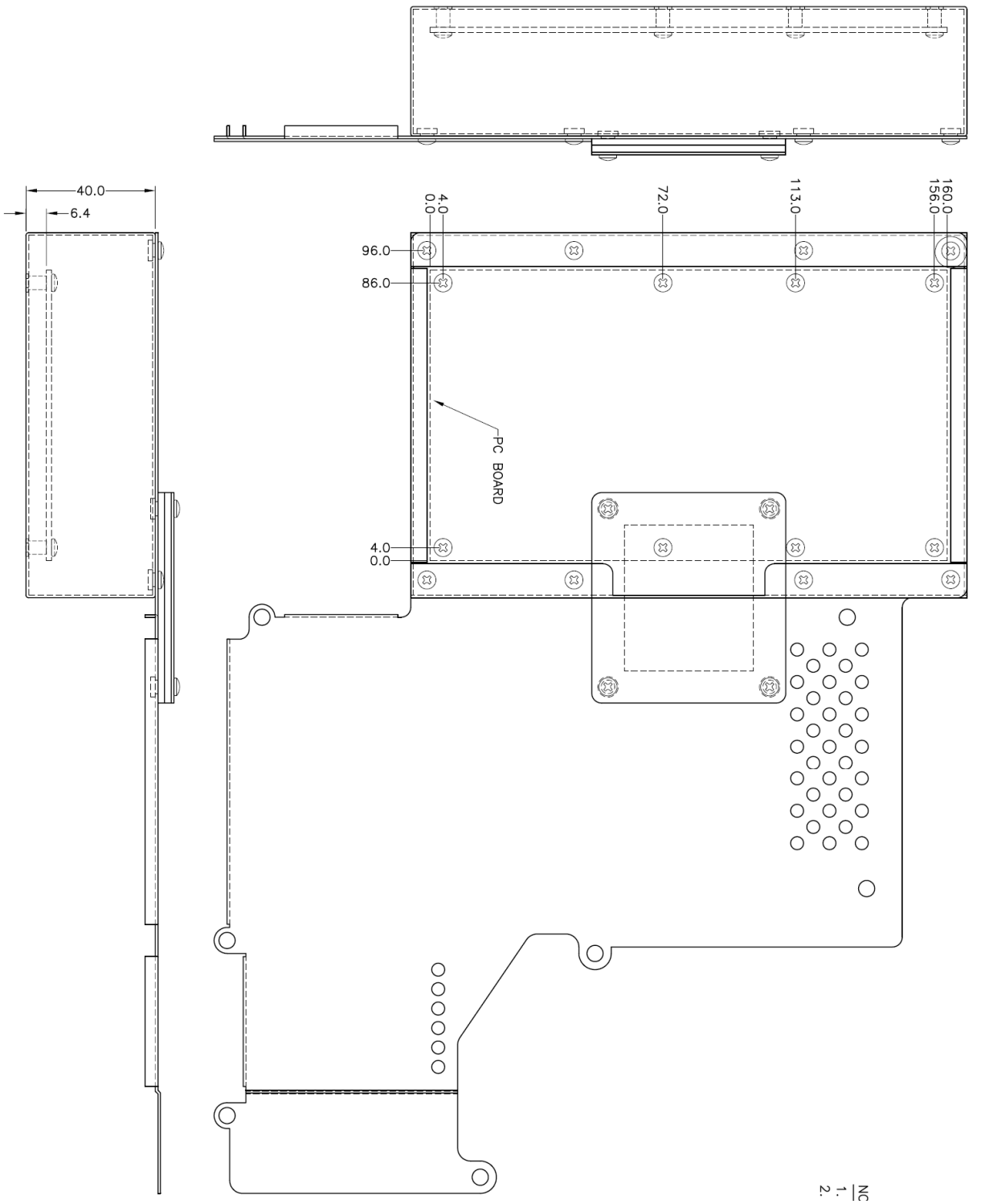

**How to fasten the radome base to the mounting platform**

4. Drill a hole of approx. 45 mm diameter through the deck or bulkhead to run the signal cable connectors and power cable between the antenna unit, the processor unit and the ships power. (To prevent electrical interference avoid running the signal cable near other electrical equipment and in parallel with power cables.) Pass the cable through the hole. Then, seal the hole with sealing compound for waterproofing.

5. The two CAT5E and Power Cables are pre-installed in the factory prior to shipping and no changes are required.

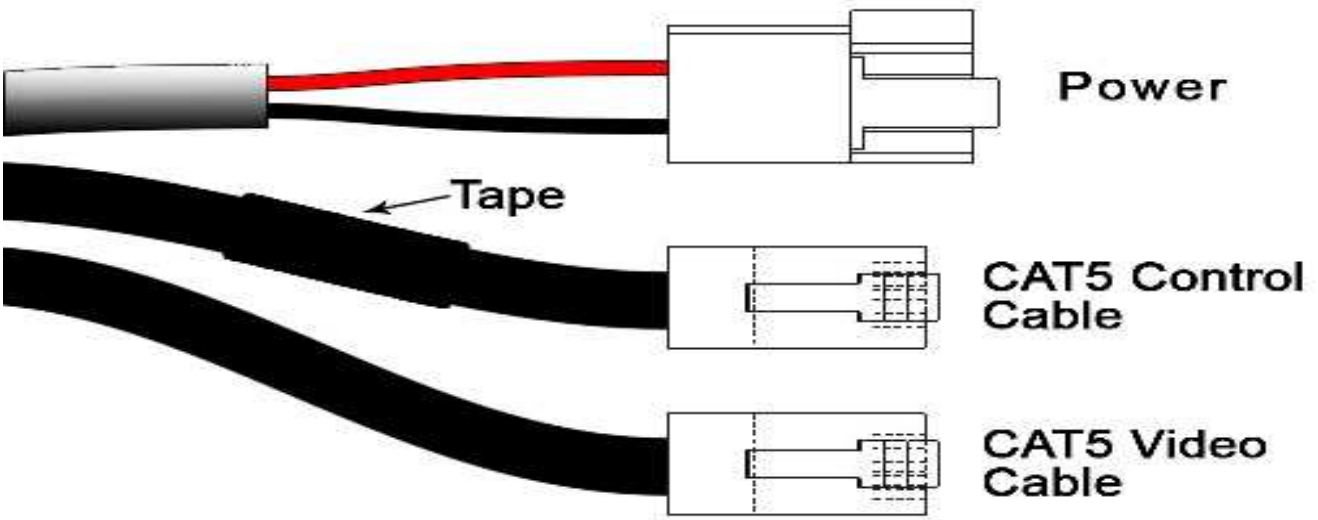



**Antenna unit, inside view**

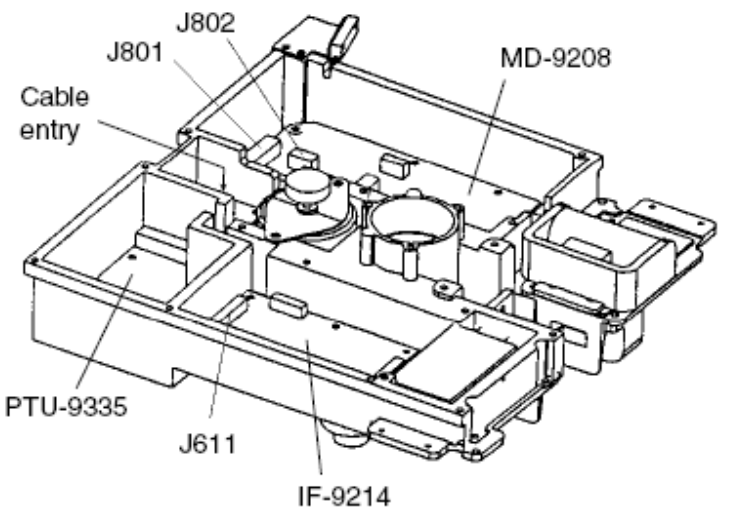



**Modified Radar Shield Cover and Mounting Hardware for RTI Electronics**

6. The three connectors for the signal and power cables are as shown below.

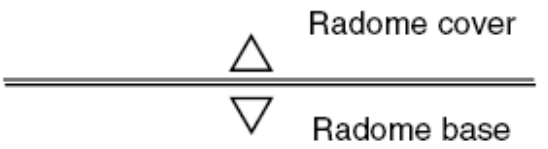



**Signal cable, antenna unit side**




**RF unit**

7. Attach the radome cover, if removed, aligning triangle mark on radome cover with that on radome base.




**How to position the radome cover**

8. Fasten the radome fixing bolts and tighten them firmly.

## *1.4 Mounting the Antenna Unit of MODEL1934C/1944C/1954C/1964C*

### 1.4.1 Mounting considerations

- The antenna unit is generally installed either on top of the wheelhouse or on the radar mast on a suitable platform. Locate the antenna unit where there is a good all-round view. Any obstruction will cause shadow and blind sectors. A mast for instance, with a diameter considerably less than the horizontal beamwidth of the radiator, will cause only a small blind sector, but a horizontal spreader or crosstrees in the same horizontal plane as the antenna unit would be a much more serious obstruction; you would need to place the antenna unit well above or below it.

- It is rarely possible to place the antenna unit where a completely clear view in all directions is available. Thus, you should determine the angular width and relative bearing of any shadow sectors for their influence on the radar at the first opportunity after fitting.

- To lessen the chance of picking up electrical interference, avoid where possible routing the signal cable near other onboard electrical equipment. Also avoid running the cable in parallel with power cables.

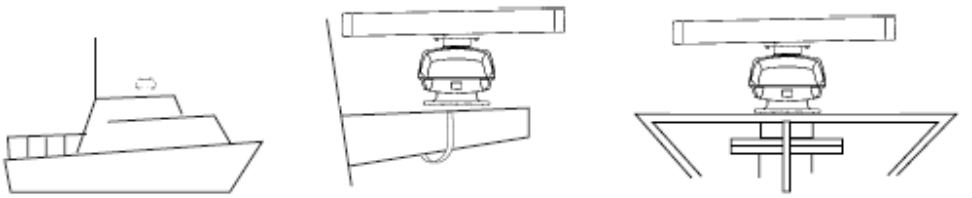
- A magnetic compass will be affected if the antenna unit is placed too close to it. Observe the compass safe distances mentioned in the SAFETY INSTRUCTIONS to prevent interference to a magnetic compass.

- Do not paint the radiator aperture, to ensure proper emission of the radar waves.

- When this radar is to be installed on larger vessels, consider the following points:

- The signal cable run between the antenna and the display units comes in lengths of 10 m, 15 m, 20m, 30 m and 50 m.
- Deposits and fumes from a funnel or other exhaust vent can adversely affect the aerial performance and hot gases may distort the radiator portion. The antenna unit must not be mounted where the temperature is more than 70℃.

As shown in the figure below, the antenna unit may be installed on the bridge, on a common mast or on the radar mast.



(a) On bridge (b) Common mast (c) Radar mast

### 1.4.2 Mounting procedure

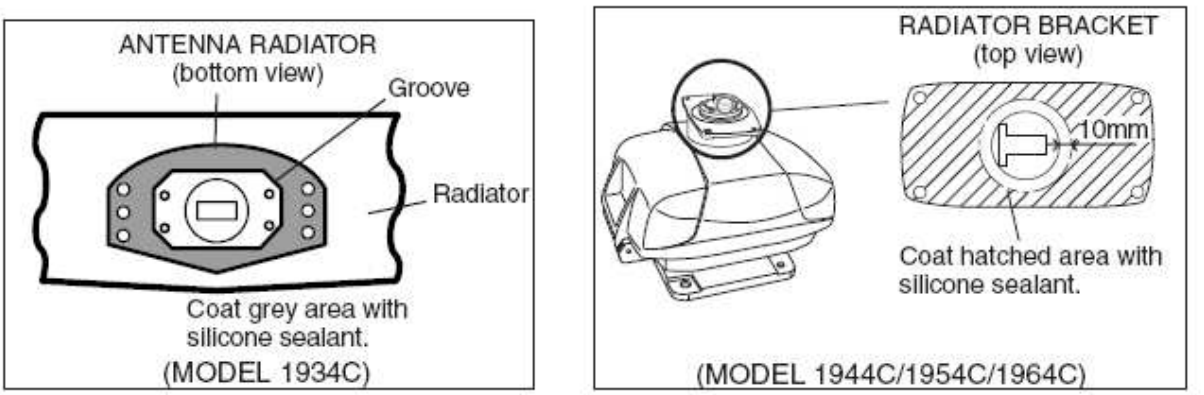
Referring to the outline drawing at the back of this manual, drill five holes in the mounting platform: four holes of 15 mm diameter for fixing the antenna unit and one hole of 45 mm diameter for the signal cable connectors.

**Fastening the radiator to the radiator bracket**

For your reference, the antenna installation materials list appears in the packing list at the back of this manual

1. Remove the radiator cap from the radiator bracket.

2. Coat contacting surface between the antenna radiator and the radiator bracket with silicone sealant as shown in the figure below.



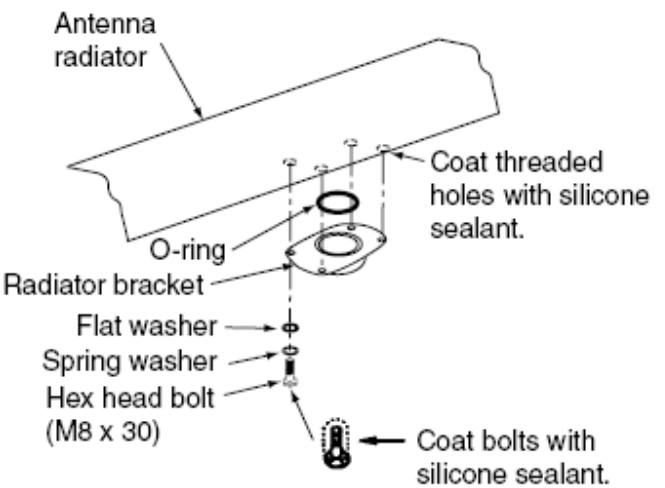

**Coating the antenna with silicone sealant**

3. Coat threaded holes on the antenna radiator with silicone sealant.

4. Grease the O-ring and set it to the radiator bracket.

5 Lay the antenna radiator on the radiator bracket.

6. Coat the radiator fixing bolts (4 pcs.) with silicone sealant. Fasten the antenna radiator to the radiator bracket with the radiator fixing bolts, flat washers and spring washers.




**Fastening the radiator bracket to the antenna unit chassis**

## Mounting the antenna unit

The antenna unit can be mounted using the fixing holes on the outside (200 x 200 mm) or inside (140 x 150 mm) the antenna unit.

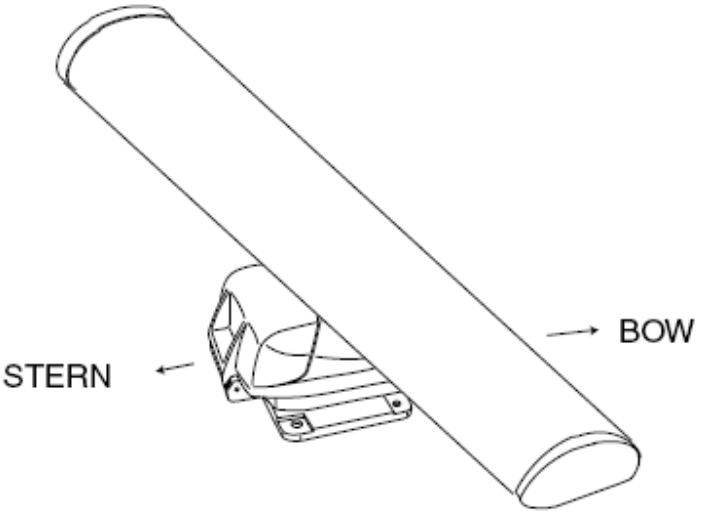
**Using outside fixing holes of the antenna housing**

Use the hex head bolts (supplied) to mount the antenna unit as below.

1. Lay the corrosion-proof rubber mat (supplied) on the mounting platform.

**Location of rubber mat**

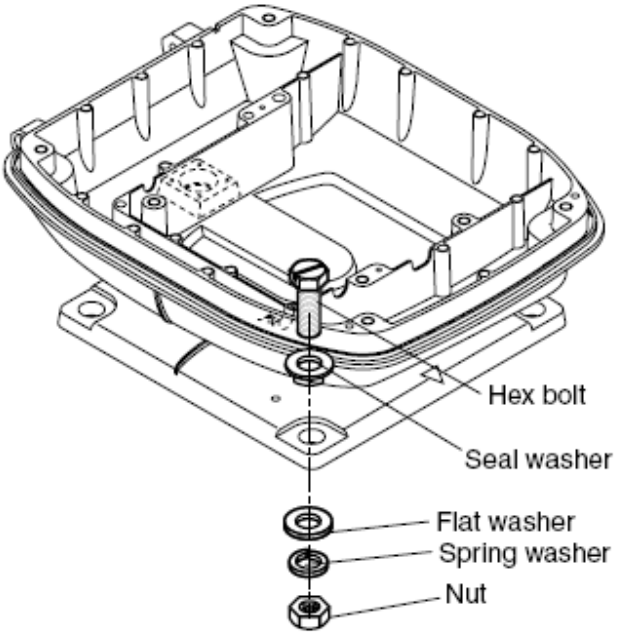
2. Lay the antenna unit on the mounting platform, orienting it as shown in below.




**Antenna unit**

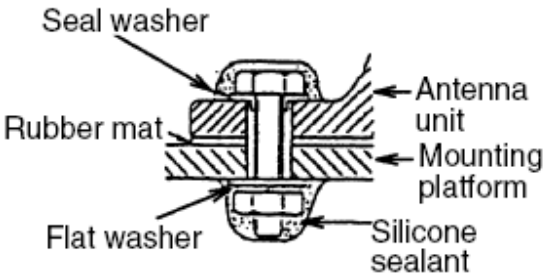
**CAUTION Do not lift the Antenna unit by the radiator; lift it by the housing the radiator may be damaged.**

3. Insert four hex bolts (M12x60, supplied) and seal washers (.30, supplied) from the top of the antenna housing, as shown below.




**Fixing the antenna unit chassis**

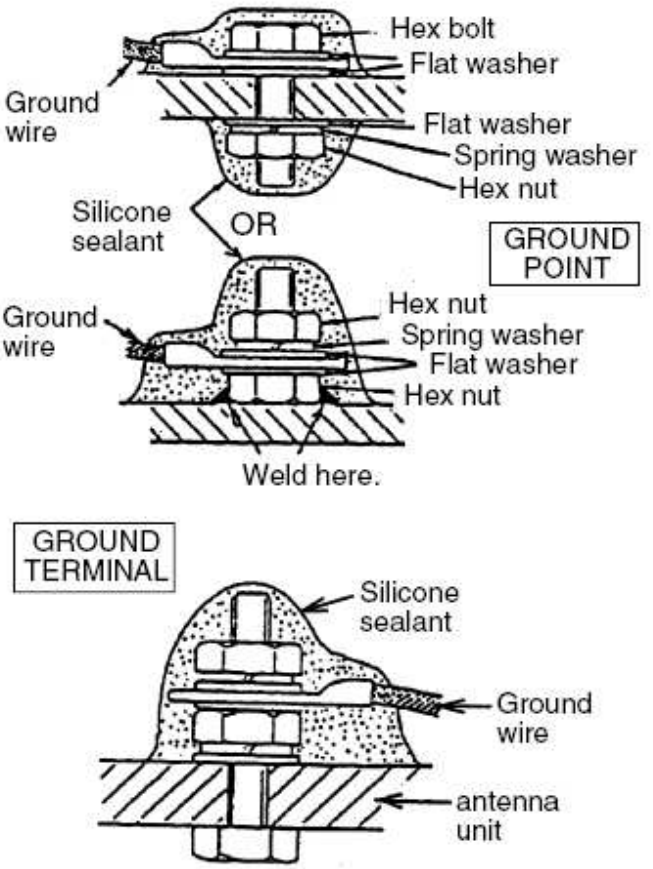
4. Pass flat washers (M12, supplied), spring washers (M12, supplied) and nuts (M12, supplied) onto hex bolts. Fasten by tightening nuts. Do not fasten by tightening the hex bolts; seal washers may be damaged.




**How to fasten antenna unit to mounting platform**

5. Coat flat washers, spring washers, nuts and exposed parts of bolts with anticorrosive sealant.
6. Prepare ground point in mounting platform (within 300 mm of ground terminal on antenna unit) using M6 x 25 bolt, nut and flat washer (supplied).
7. Run the ground wire (RW-4747, 340 mm, supplied) between the ground terminal and ground point.

8. Coat ground terminal and ground point with silicone sealant as shown below.



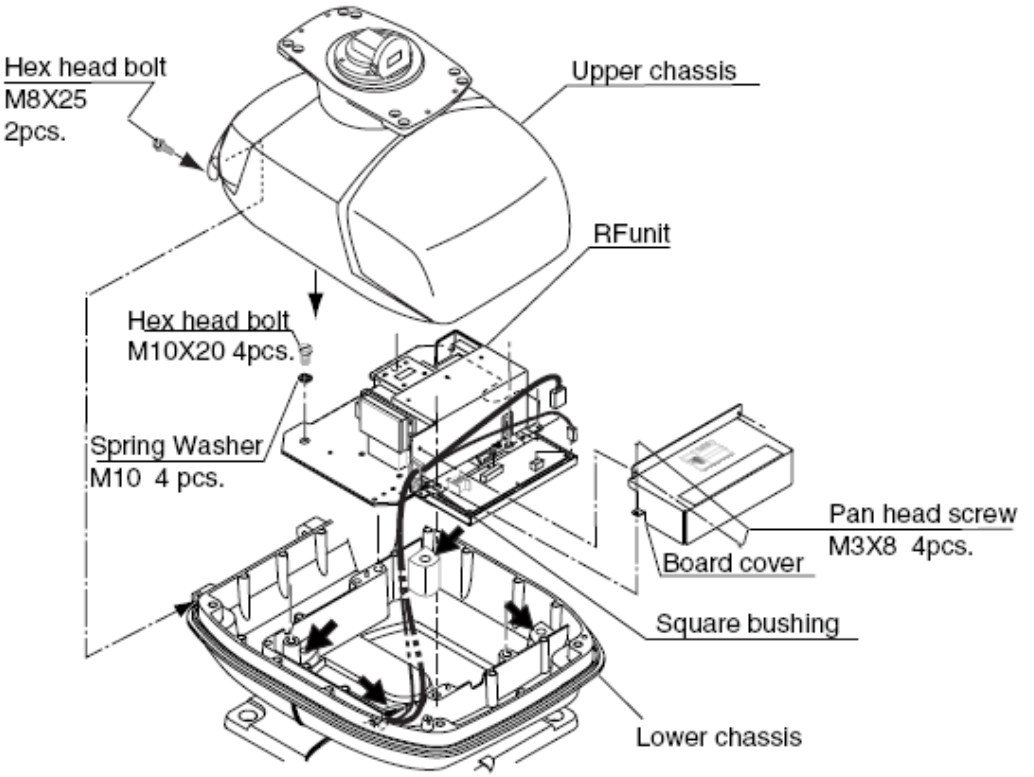

**How to coat ground point and ground terminal with silicone sealant**

**<u>Using inside fixing holes of the antenna housing</u>**

This method requires removal of the RF unit in the antenna unit to access inside fixing holes. Use hex head bolts, flat washers, spring washers and nuts (local supply) to mount the antenna unit, confirming length of bolts.

1. Unfasten four scanner bolts on the cover to open the antenna unit.
2. Unplug connector connected between upper and lower chassis.
3. Separate upper chassis from lower chassis by removing two hex head bolts (M8x25).
4. Remove the board cover by unfastening four pan head screws.
5. Remove connector from RF unit.

6. Remove RF unit by unfastening four hex head bolts.




**Antenna unit chassis, upper chassis separated**

7. Lay the corrosion-proof rubber mat (supplied) on the mounting platform.

8. Fasten the lower chassis to the mounting platform with hex head bolts, spring washers, flat washers and nuts (local supply), and then coat flat washers, nuts and exposed parts of bolts with silicone sealant. Cut a slit in the rubber bushing and insert bolt into the bushing. Do not use seal washers.

9. Reassemble RF unit, cover and chassis.

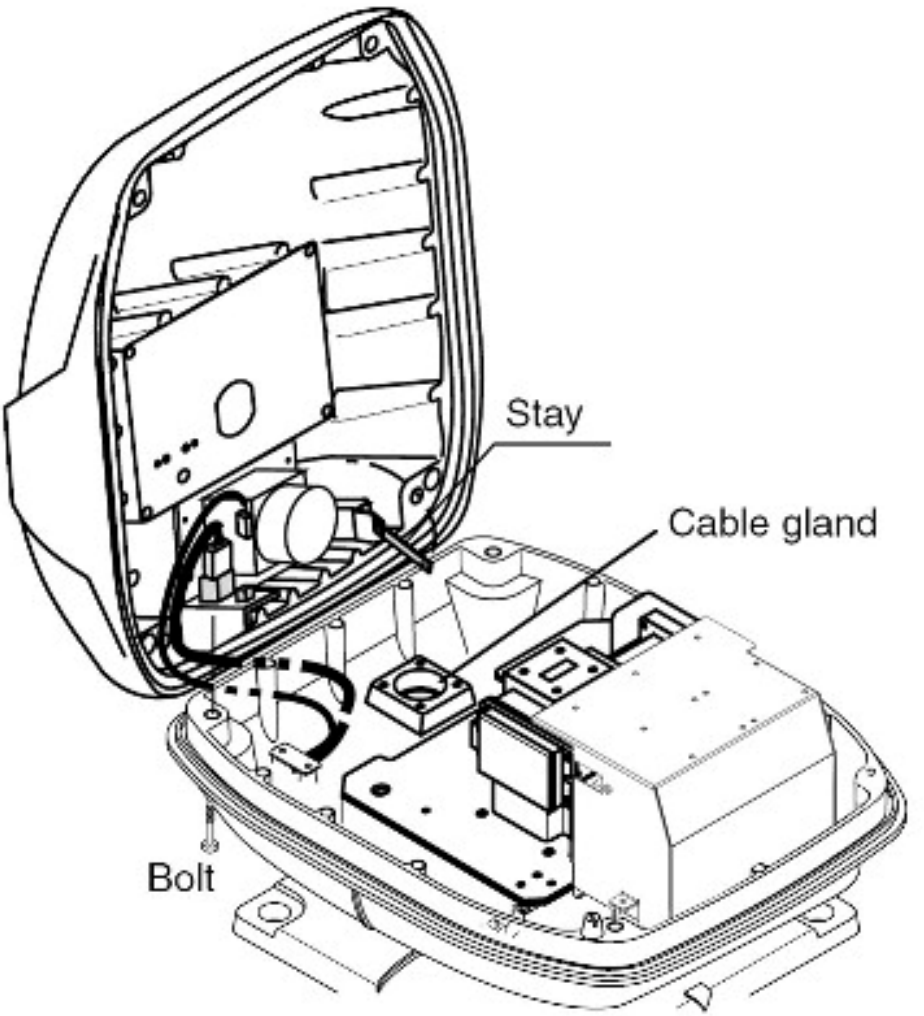
10. Set four knob caps (supplied) into outside fixing holes.

11. Do steps 6-8 in “Outside fixing holes”.

**Connecting or removing the signal cable**

Only the two CAT5E cables and the one power cable runs from the XIR3000C and ships power to the antenna unit. In order to minimize the chance of picking up electrical interference, avoid where possible routing the signal cable near other onboard electrical equipment. Also, avoid running the cable in parallel with power cables. Pass the cable through the hole and apply sealing compound around the hole for waterproofing.

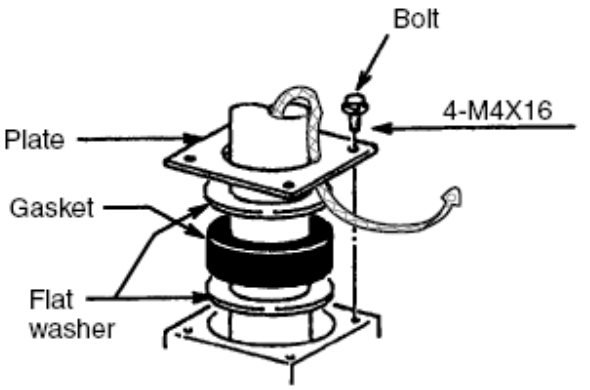
1. Open the antenna cover by loosening four bolts, and then fix the stay.




**Antenna unit chassis, cover opened**

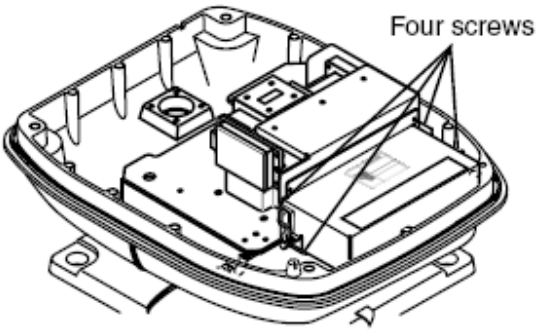
2. Unfasten the cable gland assembly (plate, gasket, flat washer), if cable not pre-installed at factory.

3. Pass or remove the signal and power cables with connector through the bottom of the antenna unit chassis, if required. Pass the cable through the gland assembly as shown below.



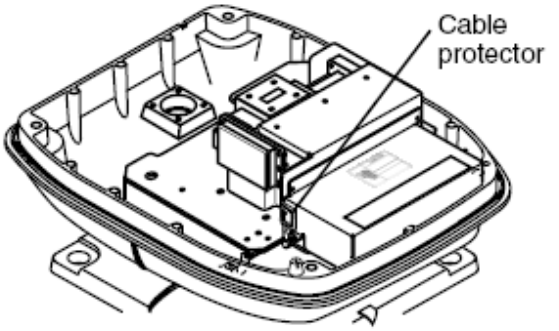

**Passing the signal and power cables through the cable gland assembly**

4. Disconnect or connect the two CAT5 cables and power cable to remove/install. The diagram below shows the internal configuration of the radar transceiver.




**Antenna unit chassis, cover opened**

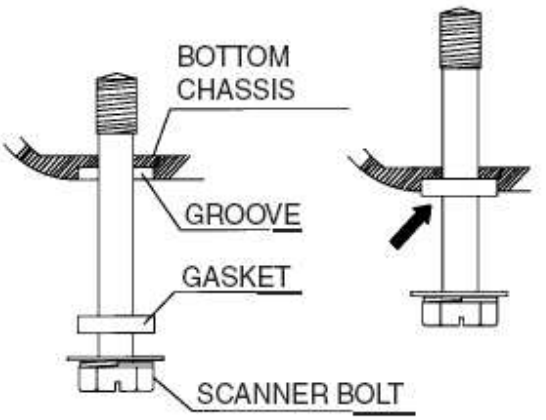
5. The two CAT5 cables and the power cable passes through the cable protector into the transceiver electronics.




**Antenna unit chassis, cover opened**

6. Release the stay and close the cover. Loosely fasten the scanner bolts; you will have to make some adjustments inside after completion of wiring.

**Note:** When closing the cover, set the gaskets to grooves in the bottom chassis, then tighten bolts.

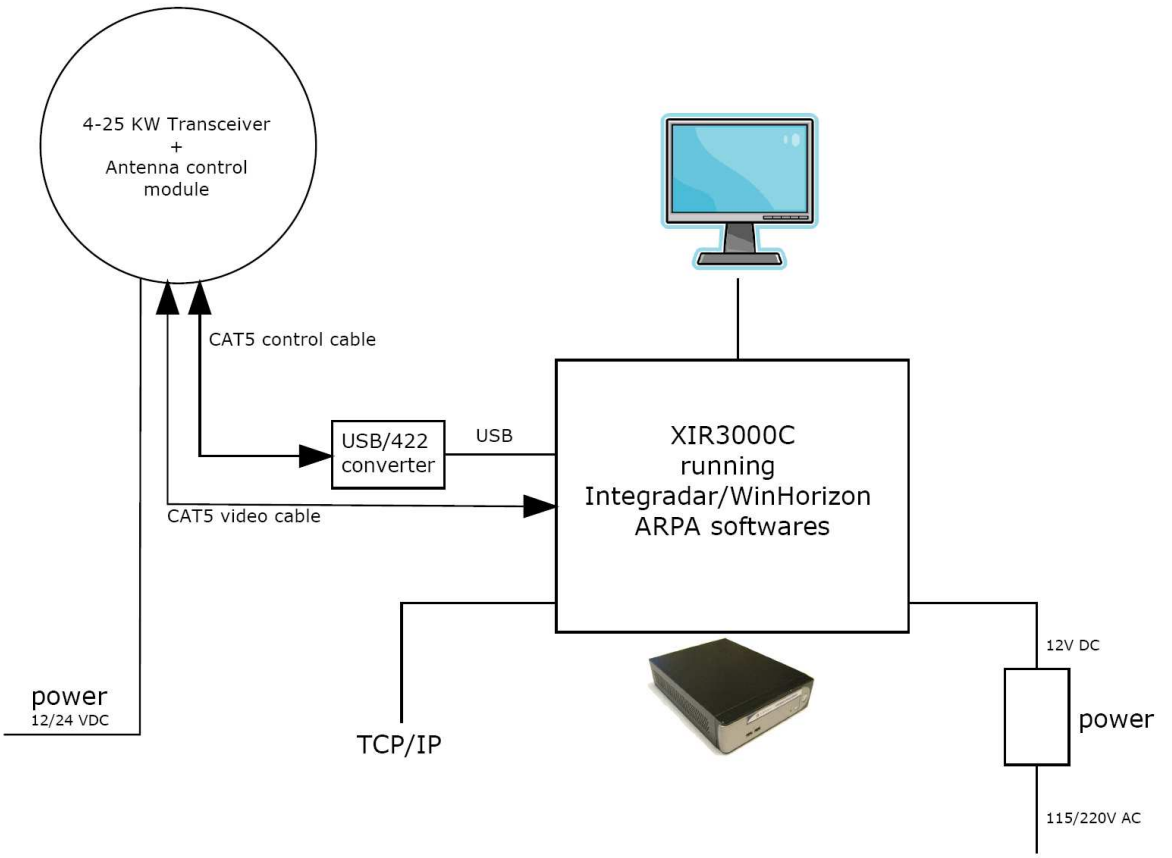



**Torque : 9.8 ±0.1 N m.**

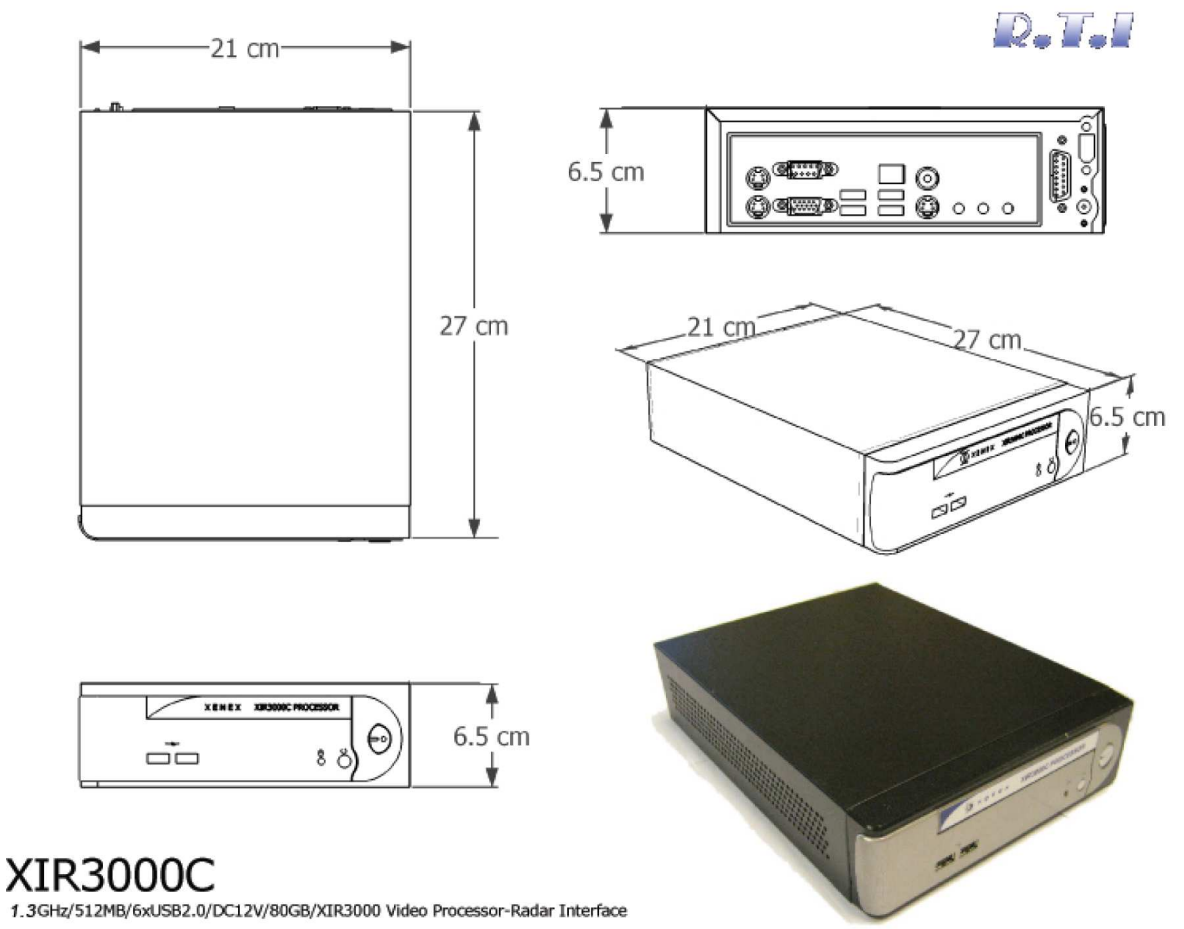
# 2. WIRING

## *2.1 Standard Wiring*

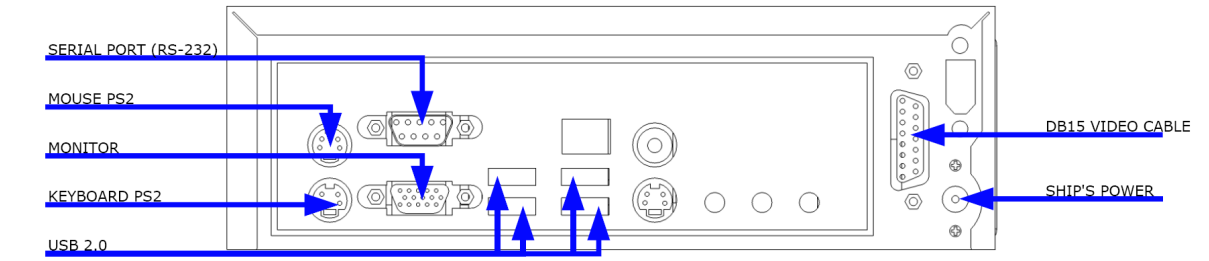
All wiring is either terminated at the rear of the XIR3000C radar processor unit or the ships power. The two CAT5 and power cables are attached to the radar transceiver at the factory and thus the transceiver does not need to be opened. See the two attached diagrams below.




**RTI PC Radar Processor Interconnection Diagram**

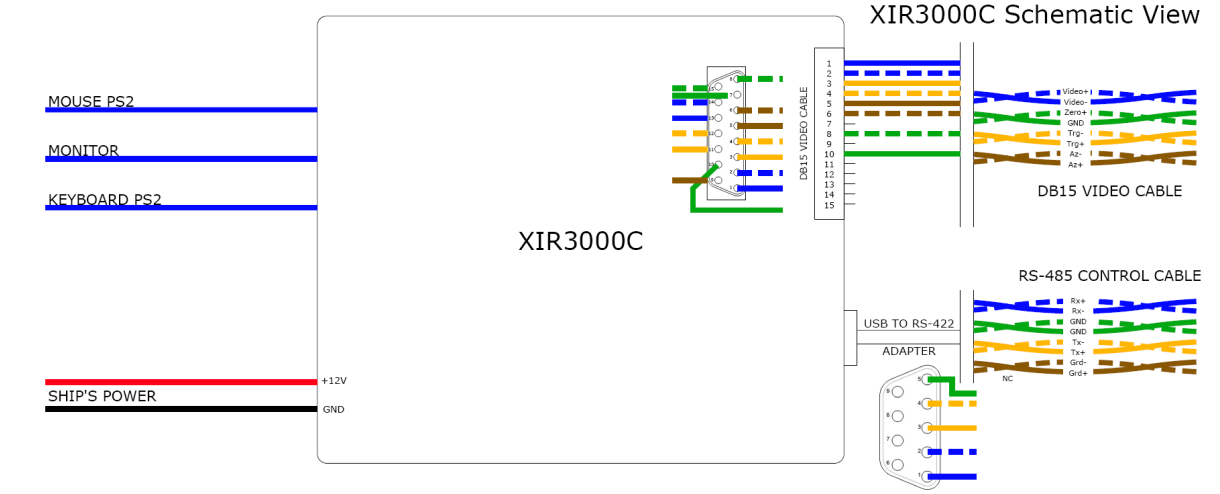



**Layout and Dimension of the XIR3000C Radar Processor System**




XIR3000C Back View

XIR3000C Schematic View

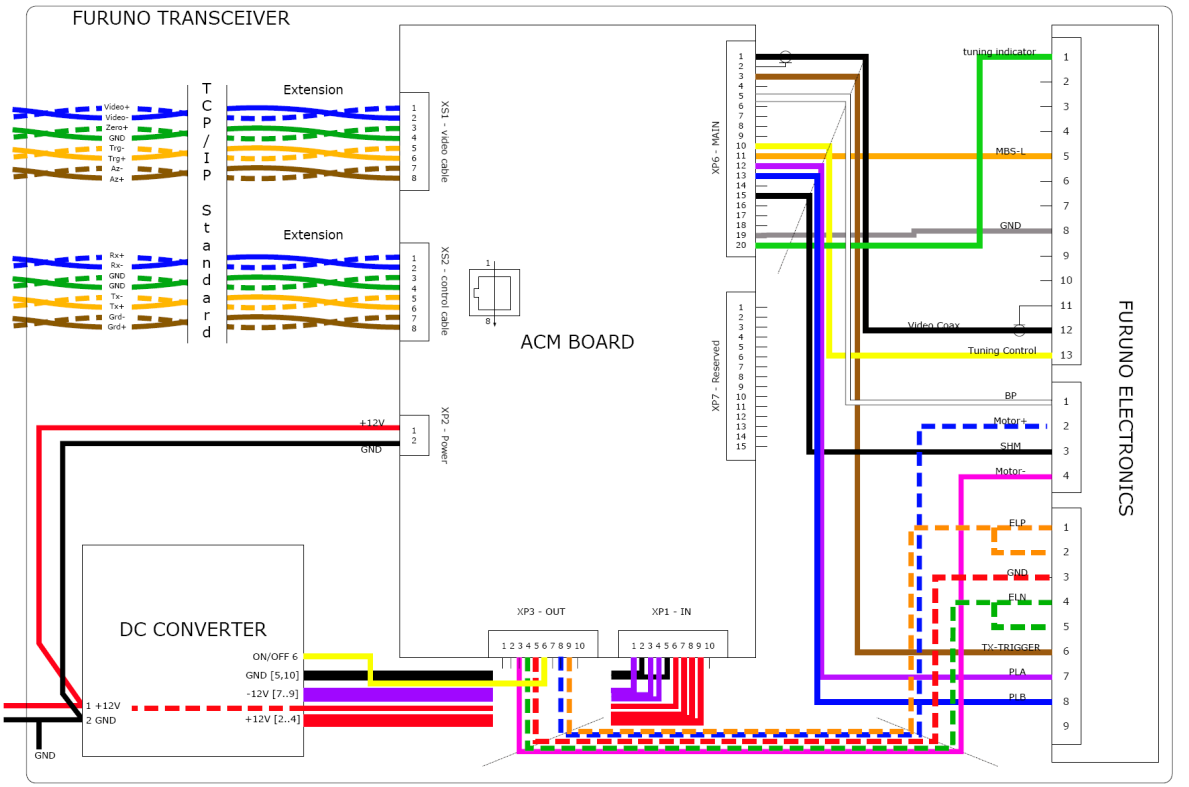



Russell Technologies Inc.

PC SIDE

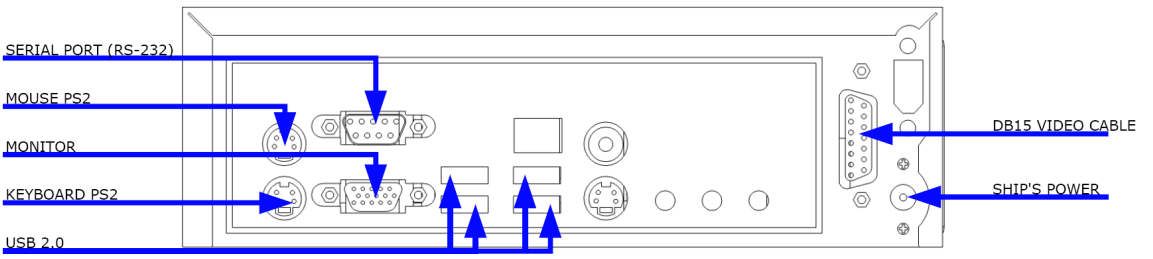
XIR3000C system
Wiring diagram for FURUNO transceiver model n. 1832
Rev8

**RTI XIR3000C SYSTEM – PART 1: MODELS 1832/1834C**



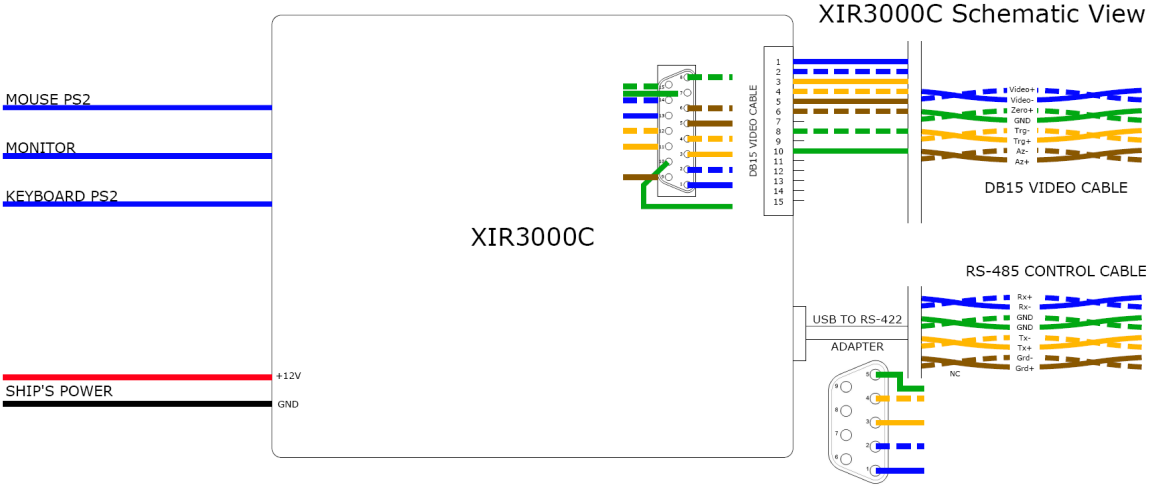

| | | |
|---|---|---|
| Russell Technologies Inc. | ACM SIDE | XIR3000C system<br>Wiring diagram for FURUNO transceiver model n. 1832<br>Rev8 |

## RTI XIR3000C SYSTEM – PART 2: MODELS 1832/1834C



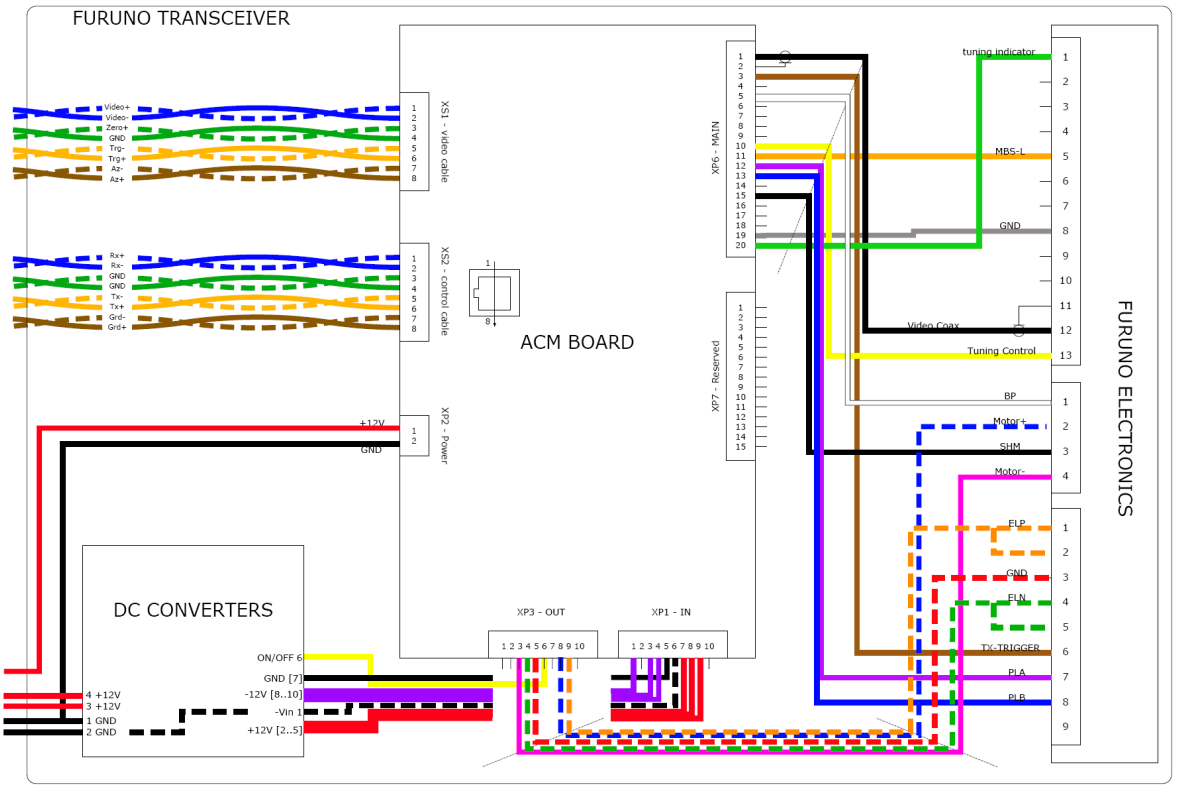

XIR3000C Back View

XIR3000C Schematic View




| | | |
|---|---|---|
| Russell Technologies Inc. | PC SIDE | XIR3000C system<br>Wiring diagram for FURUNO transceiver model n. 7112<br>Rev2 |

**RTI XIR3000C SYSTEM – PART 1: MODELS 1944/1954**




| | | |
|---|---|---|
| Russell Technologies Inc. | ACM side | XIR3000C system<br>Wiring diagram for FURUNO transceiver model n. 7112<br>Rev2 |

**RTI XIR3000C SYSTEM – PART 2: MODELS 1944/1954**

## 2.1.1 Power requirement

### Power requirement

The power for the XIR3000C radar processor unit and the radar transceiver unit must be drawn from the same power source.

# 3. SETTING UP THE EQUIPMENT

## *3.1 System Setup after Installation*

After you have installed the equipment, setting up the equipment is very easy and straight forward. Upon completion of the hardware/system installation, complete the following steps:

a. Connect radar processor to network via the TCP/IP Ethernet connection.

b. Apply power to the radar transceiver.

c. Turn ON power on radar processor

d. The system will boot-up and the radar server software will be operational and displayed.

e. If the system is run as a standalone radar system, exit out of the radar server software. If it is to be run as a client / server application, the radar server software is to remain running.

**Standalone Master Radar System**

a. To operate as a master standalone radar system, one the desktop, double click on the WinHorizon icon. The radar display will come up in the OFF mode. Ensure that the USB mode is selected.

b. Click on the ON icon and the system will take a few seconds to establish communications between the radar processor and the radar transceiver. Once this communication is established, the radar transceiver will start a WARM-UP process and will start counting down. Once the radar has warmed up, click on the STANDBY icon to start the radar operational. Radar video will now be present on the radar display. For complete operation of the ARPA/Radar software, please see the ARPA / Radar Operators Manual.

**Client / Server System**

a. Connect the radar processor to the network via the TCP/IP Ethernet connection. Note the IP address displayed on the radar processor radar server display. This IP address is needed for the remote software application.

b. Install the WinHorizon software on remote client PC.

c. Click on the WinHorizon Setup Icon on the desktop.

d. In the WinHorizon setup menu, click on the antenna and select antenna type (the radar transceiver that is connected to the radar processor).

e. In the WinHorizon setup menu, click on the TCP/IP icon and enter the correct IP address, the one for the radar server.

f. In the TCP/IP display, click on test to ensure that the remote PC is communicating with the radar processor PC.

g. Once communications are established, click on save to SAVE the changed done during the setup. Next click on START and the system will now starts as per the standalone master system. On the next power up of the system, click on the WinHorizon icon to start the system.

h. The radar display will come up in the OFF mode. Ensure that the TCP/IP Active mode is selected if no other Active Client connected.

i. Click on the ON icon and the system will take a few seconds to establish communications between the radar processor and the radar transceiver. Once this communication is established, the radar transceiver will start a WARM-UP process and will start counting down. Once the radar has warmed up, click on the STANDBY icon to start the radar operational. Radar video will now be present on the radar display. For complete operation of the ARPA/Radar software, please see the ARPA / Radar Operators Manual

## *3.2 Setup of Radar System Signals*

The system is completely configured prior to shipment from the factory. The setup process indentified below should only be undertaken by a trained technician.

### 3.2.1 RadarSample Usage Setup Instructions

This process is only required to be followed if changes are required to be made to the input signals of video, trigger (T), ships heading marker (SHM) and bearing pulse (BP) due to incorrect operation of the system. If signals are not being received by the ARPA/Radar software a warning on the radar display will indicated the signal or signals not present within the system. The “RadarSample” program is a handy utility for verifying the installation and setup of the XIR3000C radar processor interface.

The XIR3000C takes in four analog signals from your main radar system and converts these four analog signals into digital form, for use by software in the XIR3000C radar processor.

These four analog signals are described in more detail here:

- Ship's Heading Marker (SHM): this signal occurs once for every 360 degree sweep of the radar antenna, and tells the XIR3000C that the radar antenna is currently aligned with the ship's heading.

  This is a relatively low-frequency, long-duration signal.

- Bearing Pulse (BP): this signal occurs at regular intervals as the antenna rotates. The number of bearing pulses per 360 degree sweep is constant for given radar type, but varies with different radar types. By counting these bearing pulses, the XIR3000C can calculate which direction (relative to ship's heading) the radar antenna is pointing;

  This is a relatively high-frequency, medium-duration signal.

- Trigger: this signal is used to tell the transceiver when to transmit. The XIR3000C uses this signal to determine when to start digitizing the video signal (see below).

  This is a relatively high-frequency, short-duration signal.

- Video: this signal contains the actual radar data that, once digitized by the XIR3000C, makes up the radar scan line data, which is then used to generate the radar image.

It is fairly important, when using the XIR3000C, that you select the right antenna, whether using "RadarSample" or the IntegRadar Server software, or any other related application, in order for the XIR3000C to correctly find the radar signals. Or, if necessary, you must be prepared to use "RadarSample" and the new "USB VP Extended Control" menu tool to set up the signal detection (Bearing Pulse (BP), Ship's Heading Marker (SHM), and Trigger) correctly.

Here is the process for setting up the XIR3000C for any new antenna:

- make sure the XIR3000C is turned on, the cable is connected to your radar processor, and the proper drivers are installed;
- run the "RadarSample.exe" program;
- select "USB" from the "Action" menu;
- select the correct radar antenna (the one that the XIR3000C is interfaced to);

The XIR3000C needs certain antenna-specific parameters to be correctly set in order to properly detect each of the incoming analog signals (trigger, video, BP, and SHM). For example, if the trigger signal parameters are not correctly set, then the XIR3000C can't find the trigger signal, and when the XIR3000C can't find the trigger signal, the XIR3000C doesn't send any updated data to the client PC (all three analog signals – BP, SHM, and Trigger – will appear as "Missing"). Normally, the correct parameters will be part of the included antenna database.

- after a few seconds, the "RadarSample" window title should change to "RadarSample - USB";
- click on "Standby" on the "Action" menu (taking the XIR3000C off of standby) - this should bring up the settings dialog box (titled "USB");

At this point, you should see the main “RadarSample” window, showing the radar image, similar to that shown in figure 1 (which has been re-centered using the left mouse button).

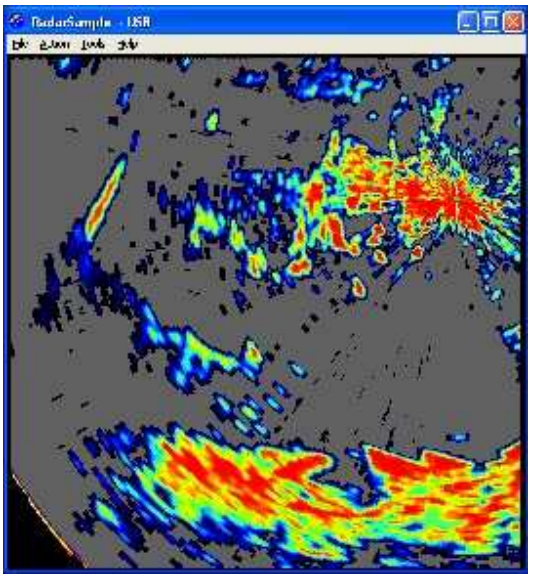


**Figure 1: “RadarSample” – Main Window**

Also, you should have the “Settings” dialog box displayed, similar to figure 2.

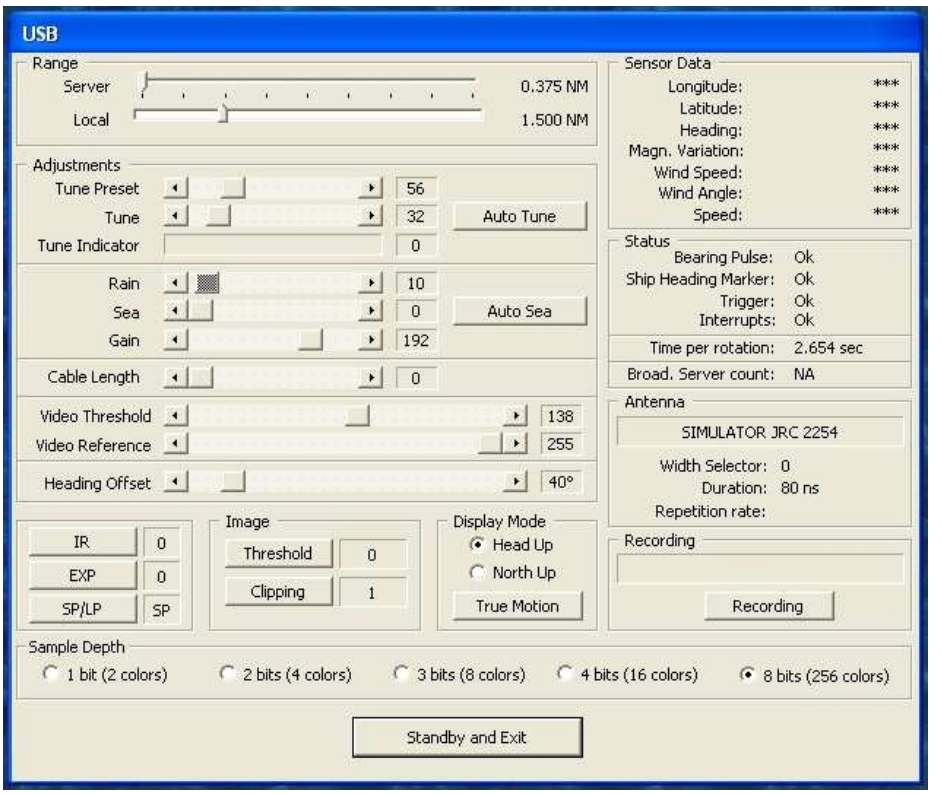



**Figure 2: “RadarSample” – Main “Settings” Dialog Box**

If you do not see any radar imagery, then we need to verify that the signals are being properly detected.

On the “Settings” dialog box (figure 2), look in the "Status" box, along the right side (second box down). The status of the three main signals ("Bearing Pulse", "Ship Heading Marker", and "Trigger") will be displayed here as either "OK" or "Missing" (or "Error", if there is some other problem).

If any of the signals is missing, you will need to use the following procedure to correctly set the parameters for receiving the signal.

Initially, set things up as follows:

- "Sample Depth" to "8 bits";
- "Rain" to 0;
- "Gain" to 255;
- "Video Threshold" to 0;
- "Video Reference" to 255;
- make sure that "IR", “EXP”, and "Threshold" are on 0;
- I also recommend setting "Clipping" to 1;

Now, click on "USB VP Extended Control", from the "Tools" menu - this should bring up the USB VP extended control settings dialog box (see figure 3).

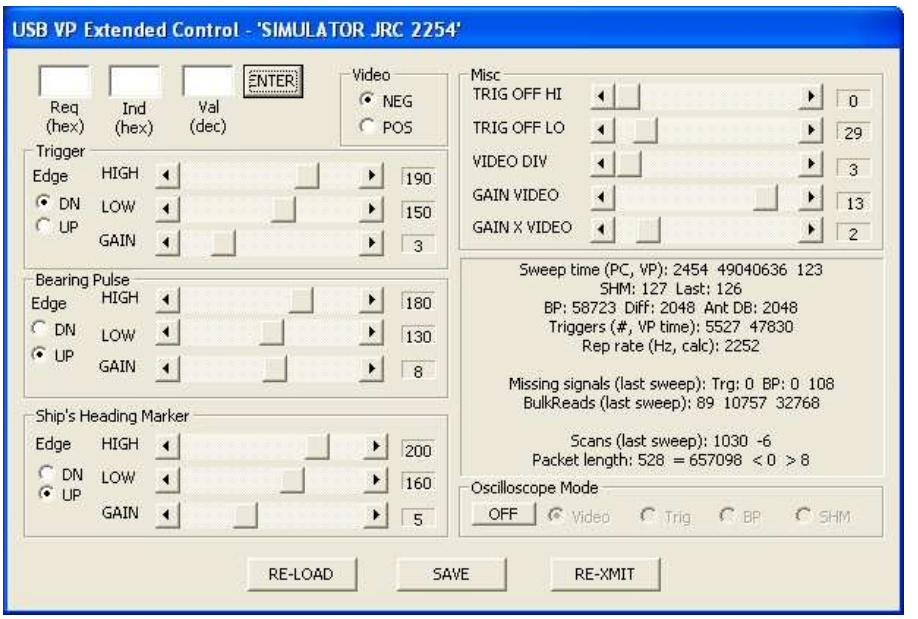



**Figure 3: "RadarSample" – USB VP Antenna Signal Setup Dialog Box**

To improve the signal setup process, we have added what we call an "Oscilloscope Mode" to the "USB VP Extended Control" dialog box (see the "Oscilloscope Mode" box on the lower right side). Using this, along with the "Radar Raw Scan Line Profile" window, we graphically display these radar signals (one at a time, based on the selection in the "Oscilloscope Mode" box) allowing for much easier determination of the corresponding "HI", "LO", "GAIN", and "Edge" settings.

To facilitate the "Oscilloscope Mode", we have added the following capabilities:

- **Control of Scale:** You can now control the scale of the "Radar Raw Scan Line Profile": by clicking on the left or right mouse button, while the mouse pointer is in the main area of the window; left clicks decrement the scale by 1 (down to 1); right clicks increment the scale by 1; holding down either CTRL key while clicking left decrements the scale by 25 (again, down to 1), while holding either CTRL key while clicking the right mouse button increments the scale by 25;

  Multiple scan lines are displayed in the window, based on scale.

  Note that the scale can also be controlled using the "VIDEO DIV" adjustment slider on the "USB VP Extended Control" dialog box.

- **Buffered Data:** Data for the "Radar Raw Scan Line Profile" window is now buffered. 1024 "scan lines" are now buffered, and input into this buffer can be

paused or un-paused by clicking on the middle mouse button while the mouse cursor is in the main area of the window. This is to facilitate finding low frequency signals, such as the SHM signal, which usually only occur every antenna rotation, or every two or three seconds. By pausing the input, you can then change the “scan line” number, and look through the buffer for the signal.

- **Graphical Display of LO / HI Values:** The two black lines that are graphically drawn on the “Radar Raw Scan Line Profile” window usually indicate the video threshold and video reference position. However, in “Oscilloscope Mode”, these lines indicate the “LO” and “HI” values for the signal being displayed.
- **Histogram:** A histogram of radar sample values is displayed in the square area on the right side of the “Radar Raw Scan Line Profile” window.

Next you need to set up the signal detection for whichever signal is missing.

To properly set up the signal, the gain should be set such that the signal just fits in the window.

The “LO” and “HI” settings tell the XIR3000C where to find the boundaries of each of the radar signals. When the selected signal first crosses the “HI” value, that point in the signal is marked as the “HI” point in the signal. At that point, the XIR3000C then looks for when the signal crosses the “LO” value. Once the “LO” value is crossed, that point in the signal is marked as the “LO” point in the signal. And the XIR3000C again starts looking for the signal to cross the “HI” value (see figures 4 to 8).

The “EDGE” value determines whether the XIR3000C uses the “HI” or “LO” value for the signal detection point. The “UP” setting corresponds to the “HI” value, and the “DN” setting corresponds to the “LO” value.

The trigger signal is the most important - until this is properly set up, the other two signals will not be properly detected.

If the trigger signal is missing, you will need to adjust the "HIGH", "LOW", and "GAIN" values on the "USB VP Extended Control" dialog box. You may also need to change the "Edge" setting from "DN" to "UP", or vice versa. Getting this wrong will either mean a big hole in the center of your radar image, or much of the area around the antenna will be missing, looking like it has been pulled into the antenna.

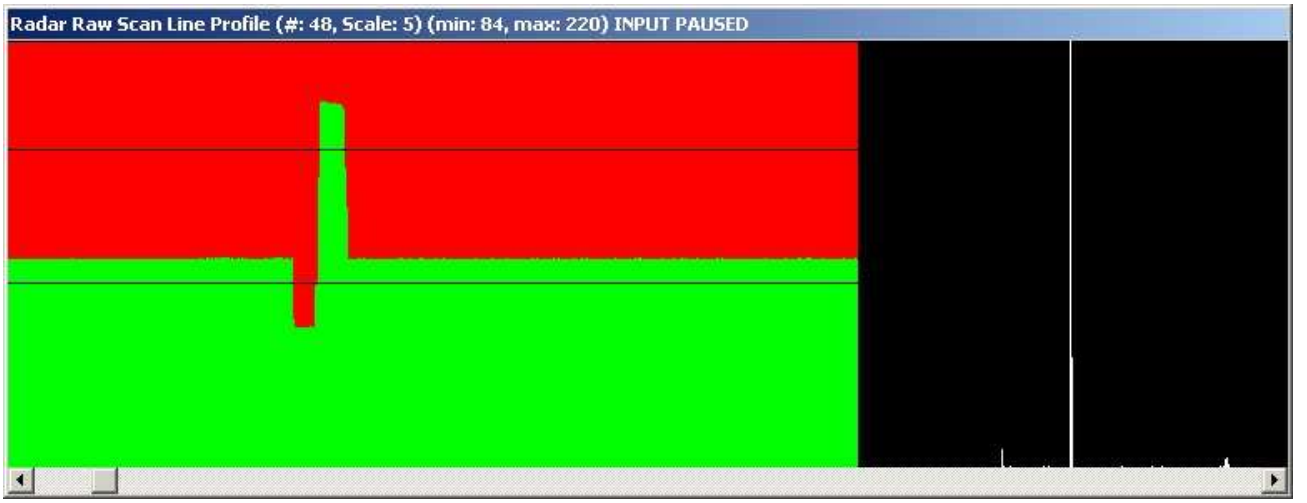



**Figure 4: “RadarSample” – Trigger signal, video divider: 0, scale: 5**

If after this process you still have no signal, you must check the cabling.

This process must be repeated for each of the three signals that are missing (trigger, BP, and SHM). After trigger, I recommend setting up the SHM signal next. I recommend clicking on the "SAVE" button on the "USB VP Extended Control" dialog box regularly as you make progress.

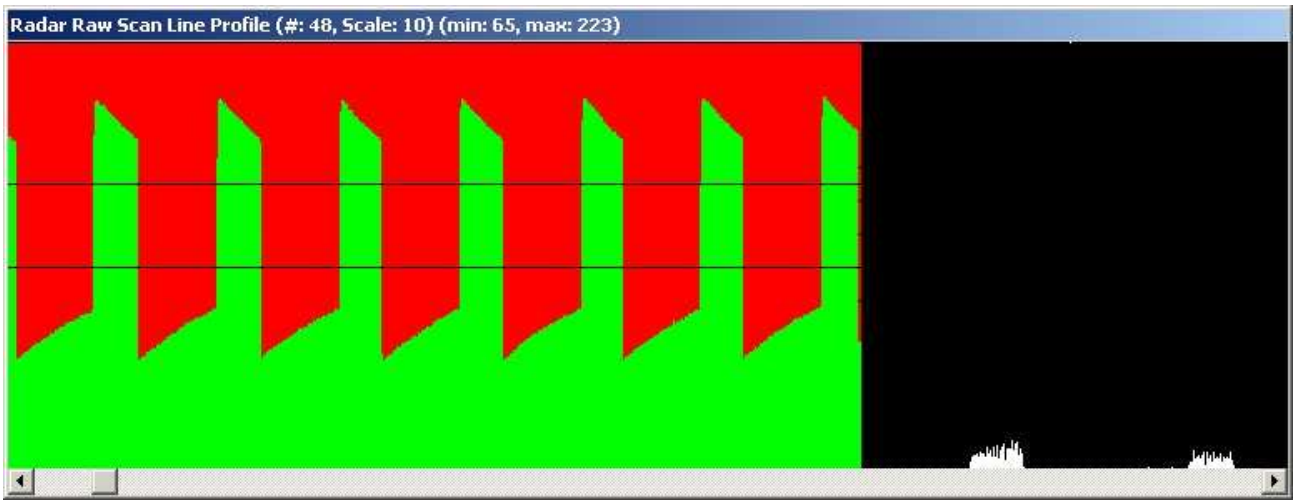



**Figure 5: “RadarSample” – BP signal, video divider: 30, scale: 10**

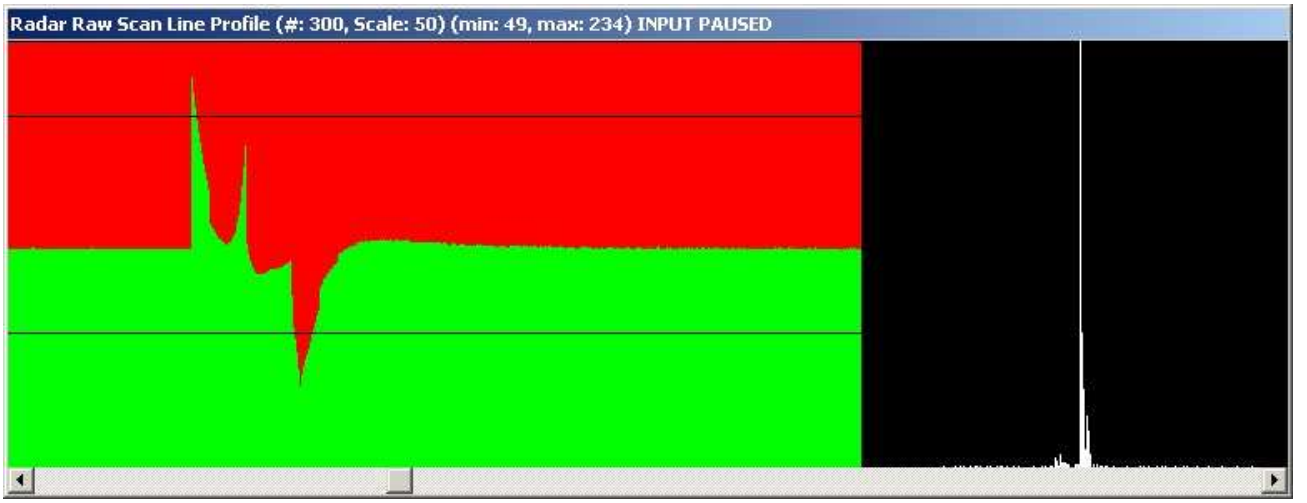



**Figure 6: “RadarSample” – SHM signal, video divider: 40, scale: 50**

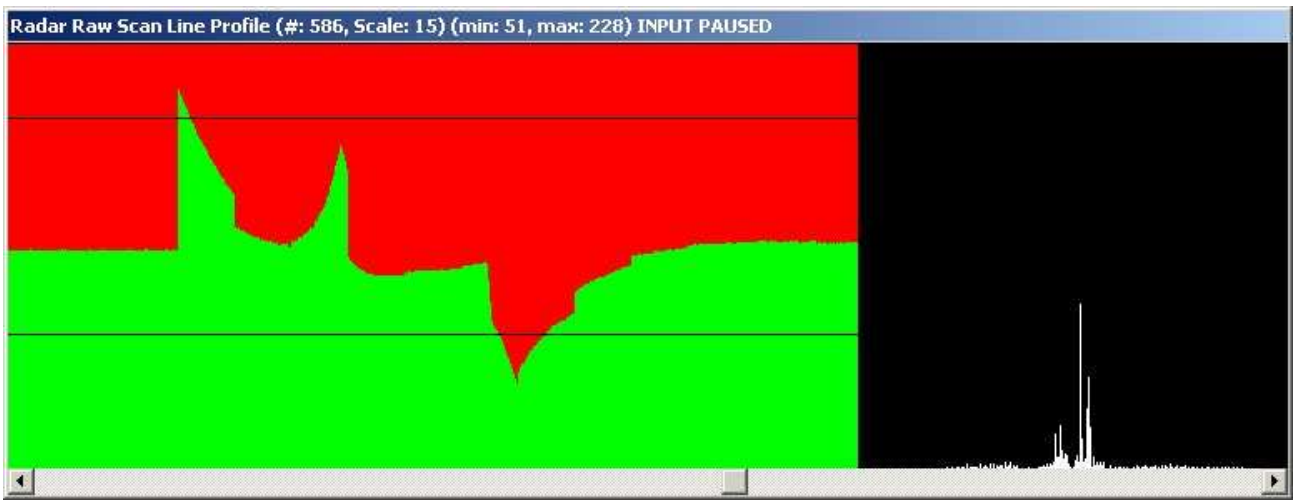



**Figure 7: “RadarSample” – SHM signal, video divider: 40, scale: 15**

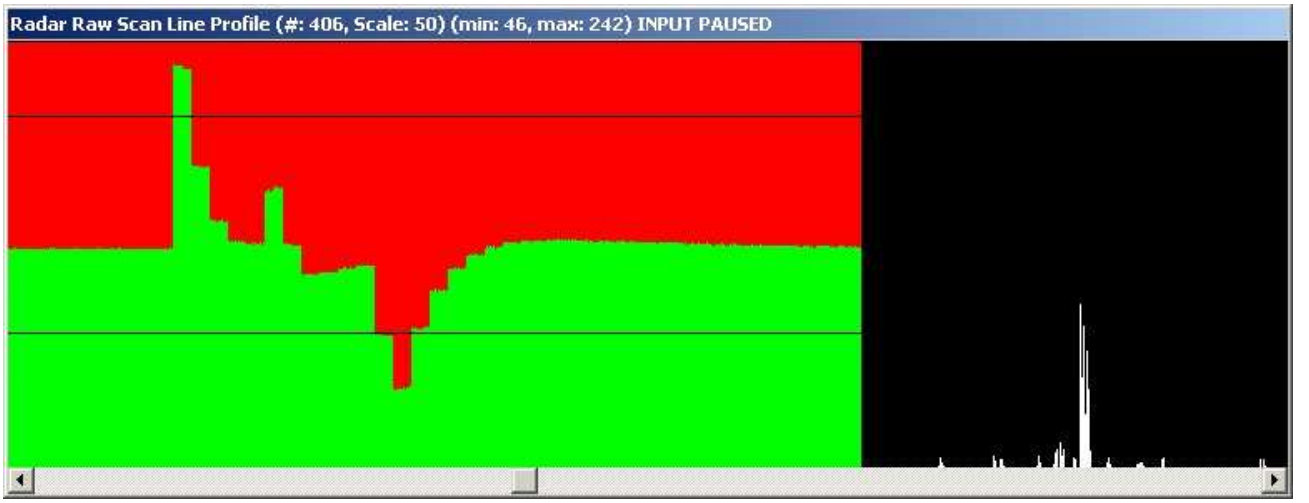



**Figure 8: “RadarSample” – SHM signal, video divider: 0, scale: 50**

The box on the middle right side of the "USB VP Extended Control" dialog box has much useful status information about the signal detection. Keep an eye on this information as you set up each of the signals.

Once these signals are properly set up, you should have radar imagery appearing on the main "RadarSample" window.

Now you are ready to set up the video signal.

Turn “Oscilloscope Mode” off.

At this point, I recommend displaying both the "Radar Scan Line Profile" and "Radar Raw Scan Line Profile" windows (see figures 4 and 5). This will give you a side view (profile) of a single selected radar scan line. The scan line number is displayed in the title bar of the two profile windows that come up, and the scan line being displayed can be adjusted with the scroll bars on the bottom of either of these two profile windows. The scan line being profiled will be highlighted by two white lines in the main "RadarSample" radar image window.

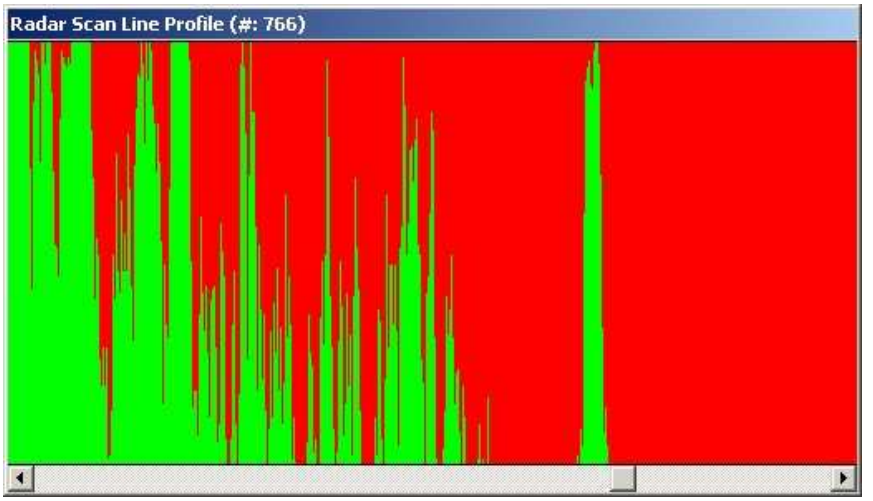



**Figure 9: “RadarSample” – Scan Line Profile Window – Displayed Data**

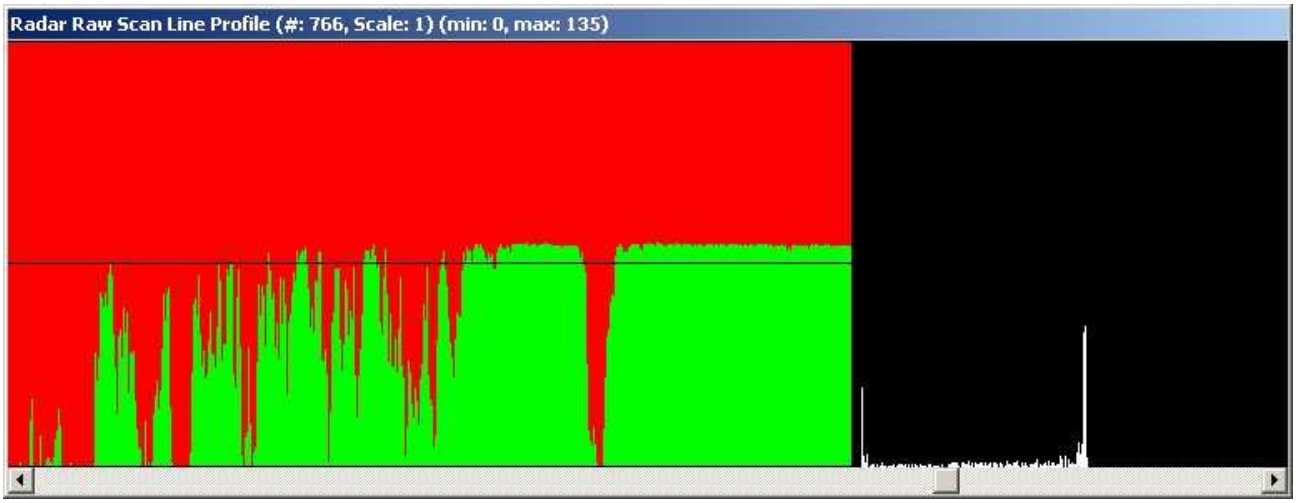



**Figure 10: “RadarSample” – Scan Line Profile Window – “Raw” Data**

Next, please click on the "Video" "POS" radio button on the "USB VP Extended Control" dialog box. The high intensity returns on the radar image should be red - if they are blue, please change from "POS" to "NEG" (or back). You can check that the signal direction is correct with the "Radar Scan Line Profile" window.

Now, the boundaries of the video signal must be set. The "Video Threshold" setting determines the lower edge of the video data, and the "Video Reference" setting determines the upper edge. The current setting of these two controls is graphically displayed on the "Radar Raw Scan Line Profile" window.

Once this process is completed, it should not need to be repeated for a given model of radar.

# RTI Packing List for XIR3000C with Furuno 1832 24” Radome Radar Transceiver

| Box 1 – XIR3000C | | Wt: 5.0 kg. Dimensions 31 cm x 15 cm x 42 cm | |
|---|---|---|---|
| | Part No. | Description | Quantity |
| 1 | XIR3000C | Radar Processor Computer System | 1 |
| 2 | Model: F10603-C | 115/12 AC/DC power Adapter | 1 |
| 3 | PHS-301 | Power Adapter Cable | 1 |
| 4 | Converter | RS-422 to USB | 1 |
| 5 | DB-15 Connector | DB15 Loop back test connector | 1 |

| Box 2 – 1832 Radome | | Wt: 13.0 kg. Dimensions 36 cm x 69 cm x 71 cm | |
|---|---|---|---|
| | Part No. | Description | Quantity |
| 1 | RSB0071-057 | 22” Radome with RTR057 RF | 1 |
| 2 | 000-862-308 | Hex Bolt M10 x 25 | 4 |
| 3 | 000-864-131 | Flat Washer M10 | 4 |
| 4 | 000-864-261 | Spring Washer M10 | 4 |
| 5 | CAT5E | 10 Meter Cables | 2 |
| 6 | Two-Conductor Cable | Power Cable | 1 |

# RTI Packing List for XIR3000C with Furuno 1834 24” Radome Radar Transceiver

| Box 1 – XIR3000C | | Wt: 5.0 kg. Dimensions 31 cm x 15 cm x 42 cm | |
|---|---|---|---|
| | Part No. | Description | Quantity |
| 1 | XIR3000C | Radar Processor Computer System | 1 |
| 2 | Model: F10603-C | 115/12 AC/DC power Adapter | 1 |
| 3 | PHS-301 | Power Adapter Cable | 1 |
| 4 | Converter | RS-422 to USB | 1 |
| 5 | DB-15 Connector | DB15 Loop back test connector | 1 |

| Box 2 – 1834 Radome | | Wt: 13.0 kg. Dimensions 36 cm x 69 cm x 71 cm | |
|---|---|---|---|
| | Part No. | Description | Quantity |
| 1 | RSB0071-057 | 22” Radome with RTR057 RF | 1 |
| 2 | 000-862-308 | Hex Bolt M10 x 25 | 4 |
| 3 | 000-864-131 | Flat Washer M10 | 4 |
| 4 | 000-864-261 | Spring Washer M10 | 4 |
| 5 | CAT5E | 10 Meter Cables | 2 |
| 6 | Two-Conductor Cable | Power Cable | 1 |

# RTI Packing List for XIR3000C with Furuno 1944 Radar Transceiver

| Box 1 – XIR3000C | | Wt: 2.9 kg. Dimensions 31 cm x 15 cm x 42 cm | |
|---|---|---|---|
| | Part No. | Description | Quantity |
| 1 | XIR3000C | Radar Processor Computer System | 1 |
| 2 | Model: F10603-C | 115/12 AC/DC power Adapter | 1 |
| 3 | PHS-301 | Power Adapter Cable | 1 |
| 4 | Converter | RS-422 to USB | 1 |
| 5 | DB-15 Connector | DB15 Loop back test connector | 1 |

| Box 2 – 1944 Transceiver | | Wt: 22.8 kg. Dimensions 53 cm x 46 cm x 46 cm | |
|---|---|---|---|
| | Part No. | Description | Quantity |
| 1 | RSB0070-059 | Gearbox w/RTR059 6 KW X'CVR | 1 |
| 2 | 000-862-180 | Hex Bolt M6 x 25 | 1 |
| 3 | 000-864-129 | Flat Washer M6 | 1 |
| 4 | 000-864-260 | Spring Washer M6 | 3 |
| 5 | 000-863-109 | Hex Nut M6 | 1 |
| 6 | 000-862-191 | Hex Bolt M12 x 60 | 4 |
| 7 | 000-864-132 | Flat Washer M12 | 4 |
| 8 | 000-864-263 | Spring Washer M12 | 4 |
| 9 | 000-863-112 | Hex Nut M12 | 4 |
| 10 | 000-515-332 | Plastic Cap | 4 |
| 11 | 100-275-580 | Corrosion Proof Mat | 1 |
| 12 | 300-130-020 | Seal Washer | 4 |
| 13 | CAT5E | 10 Meter Cables | 2 |
| 14 | Two-Conductor Cable | Power Cable | 1 |

| Box 3– Antenna | | Wt: | 6.8 kg. Dimensions 30.5 cm x 20 cm x 132 cm | |
|---|---|---|---|---|
| 1 | XN12A/4 | | Curved Face 4’ Antenna “Side Feed” | 1 |
| 2 | 000-851-313 | | “O” Ring | 1 |
| 3 | 000-862-187 | | Hex Bolt M8 x 30 | 4 |
| 4 | 000-864-262 | | Spring Washer M8 | 4 |
| 5 | 000-864-130 | | Flat Washer M8 | 4 |
| 6 | 000-854-118 | | “3 Bond” Adhesive | 1 |

# RTI Packing List for XIR3000C with Furuno 1954 Radar Transceiver

**Box 1 – XIR3000C** **Wt: 2.9 kg. Dimensions 31 cm x 15 cm x 42 cm**

| | Part No. | Description | Quantity |
|---|---|---|---|
| 1 | XIR3000C | Radar Processor Computer System | 1 |
| 2 | Model: F10603-C | 115/12 AC/DC power Adapter | 1 |
| 3 | PHS-301 | Power Adapter Cable | 1 |
| 4 | Converter | RS-422 to USB | 1 |
| 5 | DB-15 Connector | DB15 Loop back test connector | 1 |

**Box 2 – 1954 Transceiver** **Wt: 22.8 kg. Dimensions 53 cm x 46 cm x 46 cm**

| | Part No. | Description | Quantity |
|---|---|---|---|
| 1 | RSB0072-060 | Gearbox with 12 KW RF “RTR060” | 1 |
| 2 | 300-13—020 | Seal Washer | 4 |
| 3 | 000-862-180 | Hex Bolt M6 x 25 | 1 |
| 4 | 000-864-129 | Flat Washer M6 | 3 |
| 5 | 000-864-260 | Spring Washer M6 | 1 |
| 6 | 000-863-109 | Hex Nut M6 | 1 |
| 7 | 000-862-191 | Hex Bolt M12 x 60 | 4 |
| 8 | 000-864-132 | Flat Washer M12 | 4 |
| 9 | 000-864-263 | Spring Washer M12 | 4 |
| 10 | 000-863-112 | Hex Nut M12 | 4 |
| 11 | 000-515-332 | Plastic Cap | 4 |
| 12 | 100-275-580 | Corrosion Proof Mat | 1 |
| 13 | CAT5E | 10 Meter Cables | 2 |
| 13 | Two-Conductor Cable | Power Cable | 1 |

| Box 3– Antenna | | Wt: 6.8 kg. Dimensions 30 cm x 20 cm x 132 cm | |
|---|---|---|---|
| 1 | XN12A/4 | Curved Face 4’ Antenna “Side Feed” | 1 |
| 2 | 000-851-313 | “O” Ring | 1 |
| 3 | 000-862-187 | Hex Bolt M8 x 30 | 4 |
| 4 | 000-864-262 | Spring Washer M8 | 4 |
| 5 | 000-864-130 | Flat Washer M8 | 4 |
| 6 | 000-854-118 | “3 Bond” Adhesive | 1 |

**OR**

| Box 3– Antenna | | Wt: 9.1 kg. Dimensions 30 cm x 20 cm x 184 cm | |
|---|---|---|---|
| 1 | XN13A/6 | Curved Face 6’ Antenna “Side Feed” | 1 |
| 2 | 000-851-313 | “O” Ring | 1 |
| 3 | 000-862-187 | Hex Bolt M8 x 30 | 4 |
| 4 | 000-864-262 | Spring Washer M8 | 4 |
| 5 | 000-864-130 | Flat Washer M8 | 4 |
| 6 | 000-854-118 | “3 Bond” Adhesive | 1 |

# RTI Packing List for XIR3000C with Furuno 1964 Radar Transceiver

| Box 1 – XIR3000C | Wt: 2.9 kg. Dimensions 31 cm x 15 cm x 42 cm | | |
|---|---|---|---|
| | Part No. | Description | Quantity |
| 1 | XIR3000C | Radar Processor Computer System | 1 |
| 2 | Model: F10603-C | 112/12 AC/DC power Adapter | 1 |
| 3 | PHS-301 | Power Cable | 1 |
| 4 | Converter | RS-422 to USB | 1 |
| 5 | DB-15 Connector | DB15 Loop back test connector | 1 |

| Box 2 – 1964 Transceiver | Wt: 22.8 kg. Dimensions 53 cm x 46 cm x 46 cm | | |
|---|---|---|---|
| | Part No. | Description | Quantity |
| 1 | RSB0072-61 | Gearbox with 25 KW X’CVR “RTR061” | 1 |
| 2 | 000-862-180 | Hex Bolt M6 x 25 | 1 |
| 3 | 000-864-129 | Flat Washer M6 | 3 |
| 4 | 000-864-260 | Spring Washer M6 | 1 |
| 5 | 000-863-109 | Hex Nut M6 | 1 |
| 6 | 000-862-191 | Hex Bolt M12 x 60 | 4 |
| 7 | 000-864-132 | Flat Washer M12 | 4 |
| 8 | 000-864-263 | Spring Washer M12 | 4 |
| 9 | 000-863-112 | Hex Nut M12 | 4 |
| 10 | 000-515-332 | Plastic Cap | 4 |
| 11 | 100-275-580 | Corrosion Proof Mat | 1 |
| 12 | 300-130-020 | Seal Washer | 4 |
| 13 | CAT5E | 10 Meter Cables | 2 |
| 14 | Two-Conductor Cable | Power Cable | 1 |

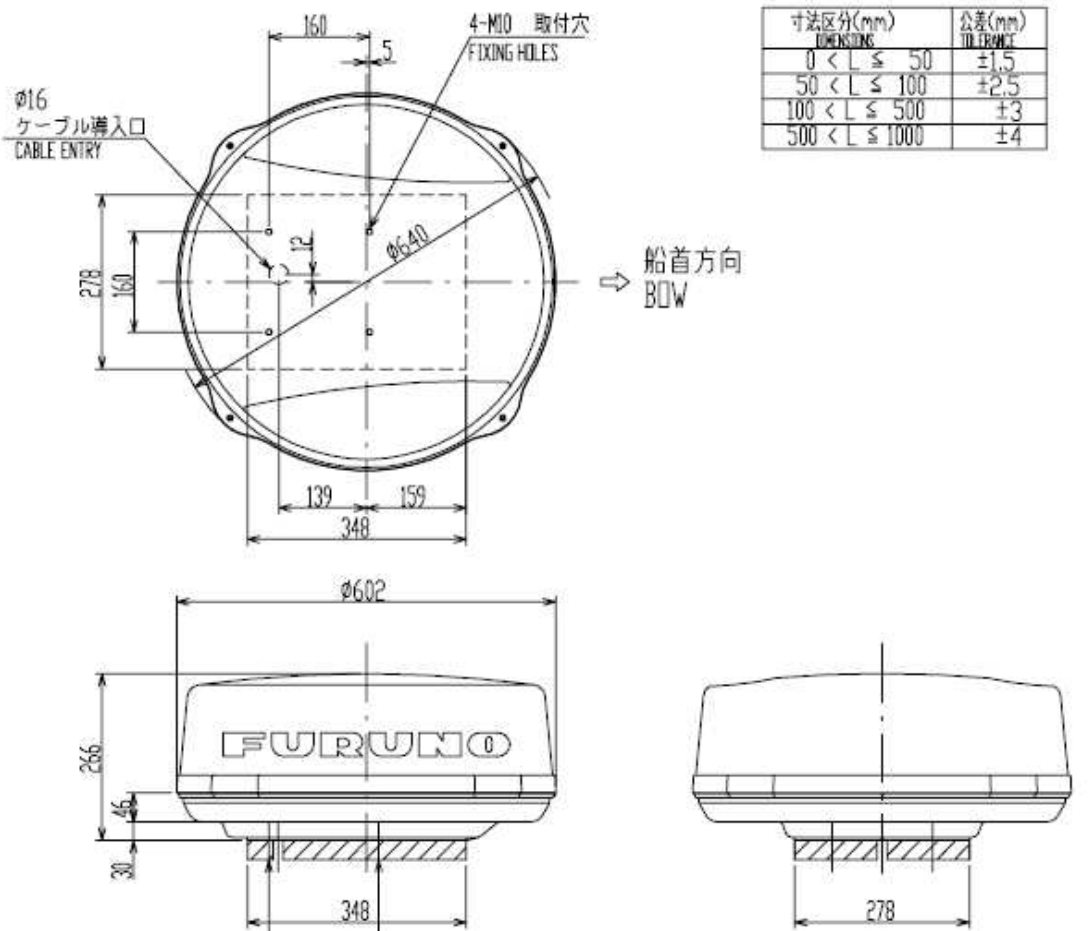
| Box 3– Antenna | | Wt: | 6.8 kg. Dimensions 30.5 cm x 20 cm x 132 cm | |
|---|---|---|---|---|
| 1 | XN12A/4 | | Curved Face 4’ Antenna “Side Feed” | 1 |
| 2 | 000-851-313 | | “O” Ring | 1 |
| 3 | 000-862-187 | | Hex Bolt M8 x 30 | 4 |
| 4 | 000-864-262 | | Spring Washer M8 | 4 |
| 5 | 000-864-130 | | Flat Washer M8 | 4 |
| 6 | 000-854-118 | | “3 Bond” Adhesive | 1 |

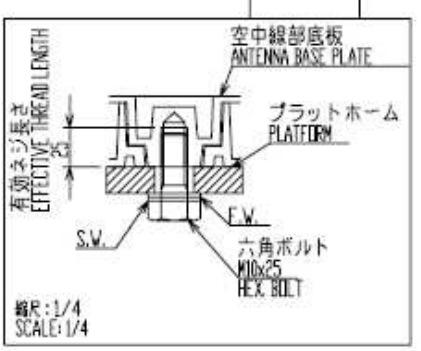
**OR**

| Box 3– Antenna | | Wt: | 9.1 kg. Dimensions 30 cm x 20 cm x 184 cm | |
|---|---|---|---|---|
| 1 | XN13A/6 | | Curved Face 4’ Antenna “Side Feed” | 1 |
| 2 | 000-851-313 | | “O” Ring | 1 |
| 3 | 000-862-187 | | Hex Bolt M8 x 30 | 4 |
| 4 | 000-864-262 | | Spring Washer M8 | 4 |
| 5 | 000-864-130 | | Flat Washer M8 | 4 |
| 6 | 000-854-118 | | “3 Bond” Adhesive | 1 |

表1 TABLE 1

| 寸法区分(mm) DIMENSIONS | 公差(mm) TOLERANCE |
|---|---|
| 0 < L ≤ 50 | ±1.5 |
| 50 < L ≤ 100 | ±2.5 |
| 100 < L ≤ 500 | ±3 |
| 500 < L ≤ 1000 | ±4 |

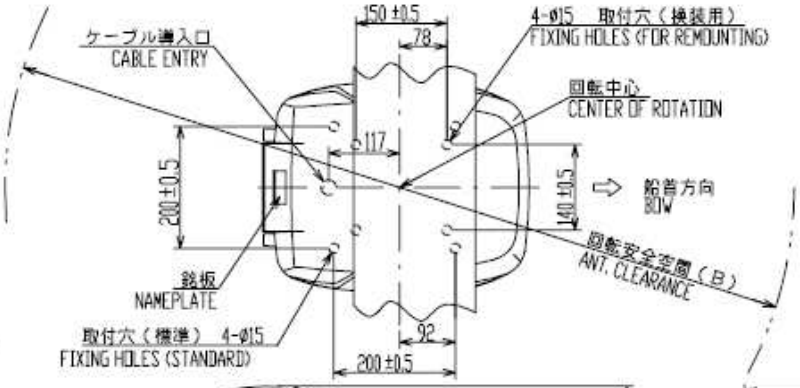



注記
指定外の寸法公差は表1による。

NOTE
TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

| | | | |
|---|---|---|---|
| DRAWN Feb. 3, '05 E. MIYOSHI | | MODEL 1734C<br>MODEL 1834C/1834C(-BB) | TITLE RSB-0071 |
| CHECKED TAKAHASHI. T | | MODEL 1833/1833C<br>MODEL 1732/1732C | 名称 空中線部 |
| APPROVED Y. Hatai | | RS-1000<br>MODEL 1832 | 外寸図 |
| SCALE 1/10 | MASS 8 ±10% kg | | NAME ANTENNA UNIT |
| DWG.No. C3441-G01- G | | 03-136-6001-G2 | OUTLINE DRAWING |




注 記

1） 指定外寸法公差は表2による。
2） 取付はM12ボルトを使用のこと。
3） 本機取付台にø25-30のケーブル貫通穴を開ける。

NOTE

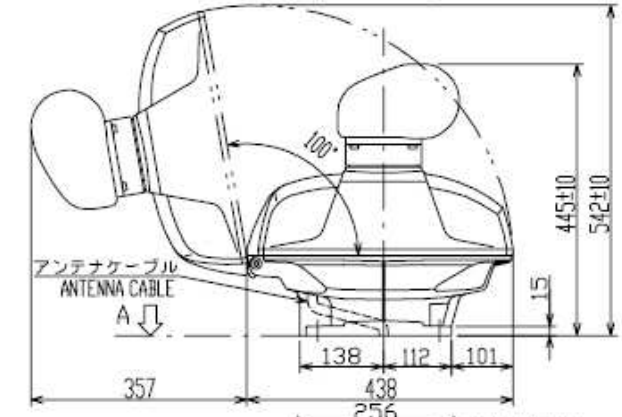
1. TABLE 2 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. USE M12 BOLTS FOR FIXING THE UNIT.
3. MAKE A HOLE ø25-30 ON MOUNTING MAST FOR CABLE PASS.

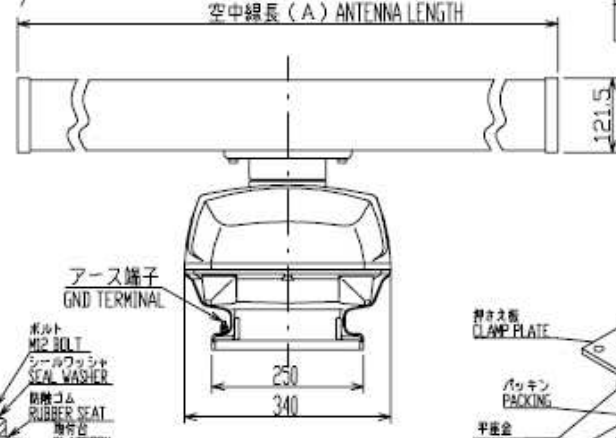
表 2 TABLE 2

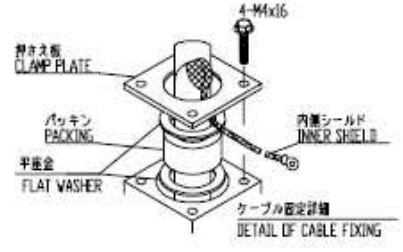
| 寸法区分（mm） DIMENSIONS | 公差（mm） TOLERANCE |
|---|---|
| L≦50 | ±1.5 |
| 50<L≦100 | ±2.5 |
| 100<L≦500 | ±3 |
| 500<L≦1000 | ±4 |
| 1000<L≦2000 | ±5 |

表 1 TABLE 1

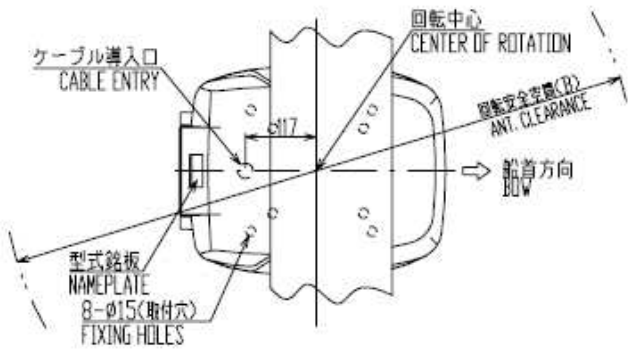
| 種 類 TYPE | XN10A | XN12A |
|---|---|---|
| 空中線長(A) ANT. LENGTH (mm) | 1036±10 | 1255±10 |
| 回転安全空間(B) ANT. CLEARANCE (mm) | 1200 | 1400 |
| 質 量 (kg) MASS (±10%) | 22 | 23 |






| | | | |
|---|---|---|---|
| DRAWN Jan. 12, '05 E. MIYOSHI | MODEL 1934C-BR/1944C-BB | TITLE | RSB-0070/0073 |
| CHECKED TAKAHASHI. T | MODEL 1934C/1944C/1954C | 名称 | 空中線部 |
| APPROVED Y. Hatai | MODEL 1938 | | 外寸図 |
| SCALE 1/10 MASS 表1参照 SEE TABLE 1 | MODEL 1762/C | NAME | ANTENNA UNIT |
| DWG.NO. C3500-G01- D | 03-142-3006-2 | | OUTLINE DRAWING |




注記 1) 指定外寸法公差は表1による。
2) 取付はM12ボルトを使用のこと。
3) 空中線部の取付台にφ25-30のケーブル貫通穴を開ける。
4) 初期製造分は取付穴寸法240x240で出荷しております。
換装時に注意してください。

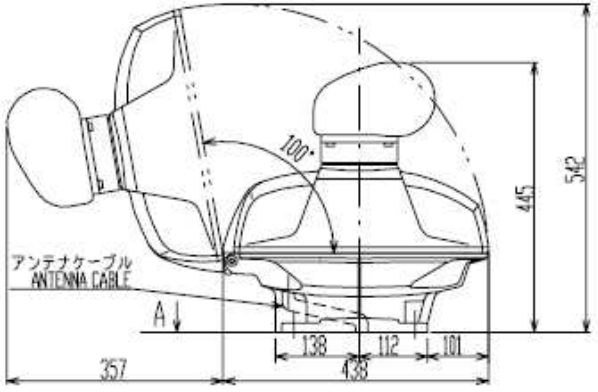
NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. USE M12 BOLTS FOR FIXING THE UNIT.
3. MAKE A HOLE φ25-30 ON MOUNTING BASE FOR CABLE ENTRY.
4. NOTE FOR REPLACEMENT: FIXING HOLE DIMENSIONS ARE CHANGED FROM 240x240 OF PREVIOUS SETS TO 200x200.

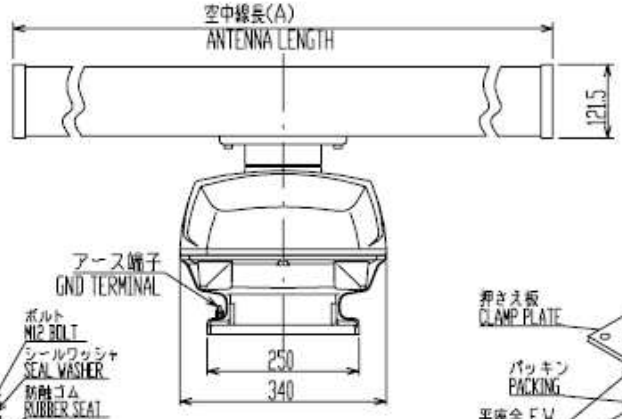
表1 TABLE 1

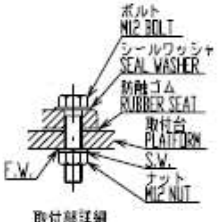
| 寸法範囲(mm) DIMENSIONS | 公差(mm) TOLERANCE |
|---|---|
| 0<L≦50 | ±1.5mm |
| 50<L≦100 | ±2.5mm |
| 100<L≦500 | ±3mm |
| 500<L≦1000 | ±4mm |
| 1000<L≦2000 | ±5mm |

表2 TABLE 2

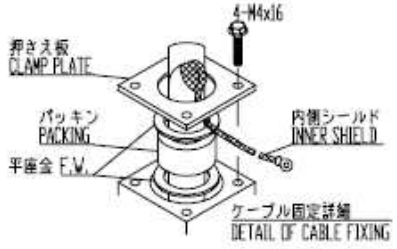
| 種類 TYPE | XN12A | XN13A |
|---|---|---|
| 空中線長(A) ANT. LENGTH(mm) | 1255±10 | 1795±10 |
| 安全空間(R) ANT. CLEARANCE(mm) | 1400 | 1940 |
| 質量 (kg) MASS | 25 | 27 |



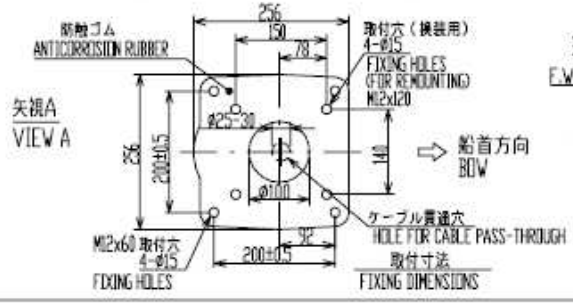



取付部詳細
DETAIL FOR FIXING



ケーブル固定詳細
DETAIL OF CABLE FIXING




| | | | |
|---|---|---|---|
| DRAWN Apr. 4, '05 F. MIYOSHI | MODEL 1954C/1954C-BB MODEL 1954C/1954C-BB FR-7040R MK FRS/RS-1000C | TITLE | RSB-0070/0072/0073 (XN12A/13A) |
| CHECKED TAKAHASHI. T | | 名称 | 空中線部 |
| APPROVED Y. Hatai | MODEL 1942ME FR-7062/7112/7252, FR-8002 SERIES | | 外寸図 |
| SCALE 1/10 MASS 表2を参照 SEE TABLE 2 | | NAME | ANTENNA UNIT |
| DWG.No. C3459-G03-F | 03-142-300G-5 | | OUTLINE DRAWING |

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